

MINERALOGICAL ABSTRACTS

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Precious Stones.

BAUER (Max) [1844-1917]. *Edelsteinkunde*. 3rd edition by [Karl] SCHLOSSMACHER, Leipzig (C. H. Tauchnitz), parts 1-6, 1928-30, pp. 1-384, 25 + 5 pls., 247 figs. Price 4 Mk. per part.

The standard work on precious stones by the late Max Bauer first appeared in 1895-96, the second edition in 1909 [Min. Mag. **15**-327], and the English translation in 1904. All these have long been out of print. In the present third edition the text has been remodelled and entirely rewritten, and, except for the coloured plates and some other of the illustrations, it is essentially a new work issued by the same publishers. It has been done by the Professor of Mineralogy in the University of Königsberg under the auspices of the German Union of Jewellers, Goldsmiths, and Silversmiths. The general part now extends to 297 pages in large octavo (23 × 19 cm.), as against 128 pages in the second edition (although the latter included in addition forms of cutting, lapidary work, uses, prices, artificial and imitation gems, &c.). This part now enlarges on the physical characters, and it is almost a treatise on the physics of crystals. Many of the points dealt with and the pictures of complex apparatus seem to be rather out of place in a book on precious stones. A valuable account (140 pages) is given of the results of recent work on the absorption and colour of gem-stones, the causes and changes of colour, and on luminescent phenomena; these being subjects evidently of special interest to the author. On the other hand, the geological aspect of the subject is reduced to a minimum. In the special part the account of diamond commences at p. 308, and the end of Part 6 still leaves us in the Brazilian diamond-fields. Much new information is given on the occurrence of diamond in India and Brazil. 'About ten parts' of the work are promised, but by far the larger portion of the book still remains to be written. Each of the six parts as yet issued contains a coloured plate. These are reproductions by the three-colour process of the original plates, and they are scarcely as good as the old lithographs, whilst the colours (a subject specially emphasized in the text) show considerable variation. The first coloured plate is numbered I, then comes a black plate II, and the succeeding coloured

plates are lettered A-E. The black plates are first printed on one side, then back to back, and the figures are in most cases numbered with those of the text. Some confusion is thus introduced with the three sets of figures.

L. J. S.

MANNUCCI (Umberto). *Le pietre preziose*. 2nd edition by Mario SIMONDETTI. Manuali Hoepli, Milano (U. Hoepli), 1929, xvi + 401 pp., 16 pls., 27 text-figs. Price 40 lire.

This neat and attractive little ($15\frac{1}{2} \times 10\frac{1}{2}$ cm.) volume on precious stones is essentially a résumé of Max Bauer's 'Edelsteinkunde'. The double plates, eight of them in colour, are also reproduced from Max Bauer's book, with a rearrangement of the figures. In this second edition (the first appeared in 1911) a new coloured plate shows rough and cut stones of blue zircon, yellow orthoclase, kunzite, hiddenite, phenakite, and benitoite. Although it is mentioned that the metric carat of 200 mg. was introduced into Italy by the law of July 7, 1910, yet the weights of the famous diamonds are still copied from the older books. A short chapter on artificial and imitation gems is added.

L. J. S.

YOUNGHUSBAND (Sir George) & DAVENPORT (Cyril). *The crown jewels of England*. London, &c. (Cassell & Co.), 1919, xi + 84 pp., 18 col. pls., 60 text-figs. Price £3 3s.

YOUNGHUSBAND (Sir George). *The Jewel House*. London (Herbert Jenkins), 1921, 256 pp., 19 pls. Price 7s. 6d.

The first of these books is a handsome quarto volume with many excellent coloured plates, showing well the famous stones in their settings. Chapter VIII (pp. 53-58) gives some account of these stones, but quite inadequate from a descriptive mineralogical point of view. The Black Prince's 'ruby' ('ballas ruby', 'spinel ruby'), the size of a small egg about 2 inches long with rounded polished surface, was given to the Prince of Wales at the battle of Najera in 1367. The Koh-i-Nur diamond, $106\frac{1}{6}$ carats, set in Queen Mary's crown. The Star of Africa¹ (Cullinan) diamond found in 1905: the largest cut gem of $516\frac{1}{2}$ carats, $2\frac{5}{16} \times 1\frac{13}{16}$ inches, in the King's sceptre; one of $309\frac{3}{16}$ carats, $1\frac{13}{16} \times 1\frac{11}{16}$ inches, mounted beneath the Black Prince's ruby in the King's state crown; two of 96 and 64 carats² with the

¹ Also called 'Stars of South Africa', but not to be confused with the Star of South Africa or Dudley diamond found on the Orange River in 1869.

² The weights quoted above are as stated in the original, but they are not in

Koh-i-Nur in Queen Mary's crown. The Stuart sapphire, oval $1\frac{1}{2} \times 1$ inch. Edward the Confessor's sapphire, dating probably from 1042 and later cut in a rose form. Queen Elizabeth's pearls.

The second (octavo) volume, by the present Keeper of the Jewel House in the Tower of London, bears the sub-title 'An account of the many romances connected with the Royal Regalia, together with Sir Gilbert Talbot's account of Colonel Blood's plot here reproduced for the first time.' This gives the same information, but with more romance; and the four coloured plates show on a smaller scale the gems in the crowns and sceptre mentioned above. The same pictures are also well reproduced in Set 1 of six coloured post-cards of the Regalia sold at the Tower of London (price 1s.). L. J. S.

SLAVÍK (F.). *Drahokamy českých korunovačních klenotů.*—*The precious stones of the crown insignia of Bohemia.* Vědy přírodní, Praha, 1930, vol. 11, pp. 1-7, 3 pls., 1 text-fig. (Česky, with English summary, pp. 5-7.)

This paper gives a summary of the 1929 report of the commission appointed to investigate the Bohemian crown jewels. The Saint Václav ('Good King Wenceslas', d. 929) crown was made in 1346. It contains 46 red stones, the largest $4 \times 3\frac{1}{2}$ cm., most of which are ruby, and a few spinel; 20 blue stones, the largest 5×4 cm., which are sapphire, except two probably cordierite; 25 emeralds and 20 pearls. The rubies and sapphires are no doubt Indian, and the emeralds from Upper Egypt. Many of the stones show their original pebble-form with the surface polished. The orb and sceptre are later (sixteenth century) and show table-cut rubies and sapphires.

L. J. S.

KUNZ (George Frederick). *Precious and semi-precious stones.* Mineral Industry, New York & London, 1929, vol. 37 (for 1928), pp. 512-537.

Continuation of previous annual reports [M.A. 4-67]. A diamond weighing 1,500 carats but of poor quality and a red diamond of 18 carats are reported from Lichtenburg, Transvaal.

all cases correct; nor is the value of the carat-weight stated. The metric carat, the legal unit of weight since 1914, is not mentioned. The Cullinan gems were weighed against the English Board of Trade 1888 carat of 205.304 milligrams (see Min. Mag., 15-322). The Koh-i-Noor ($106\frac{1}{6}$ not $106\frac{1}{8}$ carats) was weighed in 1852 against the older English carat of 205.409 mg., which gives an equivalent of 108.93 metric carats or 21.786 grams.

GILBERT (Anna H.) & DANA (John Cotton). *Gems and gem minerals, a catalogue of the Goetzke collection.* The Museum, Newark, New Jersey, 1929, 28 pp., 1 fig.

A list is given of the names of minerals, &c., in the collection of about 5.000 specimens formed by Otto Goetzke of Newark, and now exhibited in the Museum at Newark, New Jersey. L. J. S.

FERSMANN (A.). *Die Schmuck- und Edelsteine der Sowjetrepubliken.* Zeits. Prakt. Geol., 1929, vol. 37, pp. 209–216, 2 figs. (maps).

Extracts from vol. 1 (1922) of the author's book on the 'Precious and coloured stones of Russia' [M.A. 2–522, 3–65]. L. J. S.

FARRINGTON (Oliver C.). *Famous diamonds.* Field Museum of Natural History, Chicago, Geology Leaflet 10, 1929, 27 pp., 5 pls.

This pamphlet gives interesting accounts of the history of most of the famous diamonds, models of which are exhibited in the Field Museum of Natural History. The author has evidently consulted the best authorities for his information.¹ The plates include a representation of an engraving of Jean Baptiste Tavernier, by whom so much of the history of the famous Indian diamonds has been recorded. W. C. S.

FRIEDEL (G.). *Sur la biréfringence du diamant.* Bull. Soc. Franç. Min., 1924, vol. 47, pp. 60–94, 1 pl., 24 text-figs.

FRIEDEL (G.) & RIBAUD (G.). *Sur une transformation du diamant.* Compt. Rend. Acad. Sci. Paris, 1924, vol. 178, pp. 1126–1129.

——— *Sur une transformation du diamant à haute température.* Bull. Soc. Franç. Min., 1924, vol. 47, pp. 94–117, 8 figs.

The first paper gives a short historical account of the birefringence of diamond dating from Brewster's first researches on the subject in 1815. A detailed study of the black bands observed with polarized light in thin sections of diamond is then given; fragments of rock-salt and glass when heated and cooled quickly yield similar bands, which, however, are more closely related to the external contours of the fragments. The birefringence of diamond is due to mechanical

¹ A detailed account of the history of the 'Pitt' or 'Regent' diamond has been given by Lady Constance Russell in 'Swallowfield and its owners' (London, 1901), which differs in a few minor details from that given by O. C. Farrington.

strain and not to any lack of symmetry, The author concludes from a study of the bands that the strain is not produced externally but internally. The second (and third) paper describes the changes in these bands on heating a diamond to high temperatures at atmospheric pressure; it is concluded from these experiments that a polymorphic transformation takes place at a temperature $1885^{\circ} \pm 50^{\circ}$ C. Such a change, probably accompanied by change of volume, would adequately account for the birefringence of diamond. At such temperatures, however, diamond changes to graphite, and probably silicates would also oxidize diamond readily.

F. A. B.

WILLIAMS (Alpheus F.). *Diamond-bearing alluvial gravels of the Union of South Africa*. Third Empire Mining and Metallurgical Congress, South Africa, 1930. Preprint, 169 pp., 2 pls., figs.

The distribution and transportation of the diamond-bearing gravels are considered in some detail. Those on the coast of Namaqualand and South-West Africa, to the south and north of the present mouth of the Orange River, are believed to have been brought down by this river [M.A. 4, 69]. In the Lichtenburg area, western Transvaal, where diamonds were discovered in 1926 [M.A. 4-68], the gravels of an ancient river system are richest in large pot-holes in the dolomite. Although parcels of diamonds from each of these and other areas have certain characteristics, it is believed that the stones have been derived mainly from known and unknown kimberlite pipes (Cretaceous age), though it is possible that some may have come from the conglomerates of the Witwatersrand (pre-Cambrian).

L. J. S.

DRAPER (David). *The birth of the diamond industry in South Africa*. South African Mining and Engineering Journal, 1929, vol. 40, pt. 1, pp. 675-677, . . . 728-729; vol. 40, pt. 2, pp. 16-17 . . . 439-440; 1930, vol. 40, pt. 2, pp. 495-496, 570-572, figs.

The larger Part I gives an account of the winning of diamond in South Africa during the period 1868-75, with many interesting personal reminiscences by the author, who was at Kimberley in 1868, and reproductions of several old pictures. Part II, 'Notes on the genesis of the diamond', gives the substance of the author's papers [M.A. 1-381, 2-524] dealing more particularly with diamond in Brazil. The article is continued in nineteen weekly parts, and a reprint in book form is promised.

L. J. S.

BÉTIM (A. P. L.) [i. e. BETIM PAES LEME (Alberto)]. *Considérations sur les gisements de diamants du Brésil*. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 51-55.

The diamond-bearing deposits of Minas Geraes have been compared to the kimberlites of South Africa by D. Draper [M.A. 2-524] and E. Rimann [M.A. 1-131]. D. Guimarães has shown, however, that the matrix is chiefly a siliceous cement rich in sericite: both the pseudo-kimberlites investigated by Draper and Rimann are poor in olivine and low in magnesium content. The author discusses Guimarães's results, and states that the matrix contains 1 gram of platinum per ton. Recently the alluvial gravels of the river Tibagy, Parana, have been exploited. They contain over 1 carat of diamond per cubic metre, 95 % of which is of good quality. Here the picrites occur in narrow zones and a close resemblance to the kimberlites of South Africa would appear to exist. F. A. B.

FREISE (Frederico W.). *The diamond deposits on the upper Araguaya river, Brazil*. Econ. Geol., 1930, vol. 25, pp. 201-207, 1 fig.

Diamonds were discovered in 1920 in the Rio das Garças (16° S., 52½° W), a tributary of the Araguaya in the State of Matto Grosso. In the river bed there are a number of bars formed by quartz veins traversing mica-schists; and it is from the gravel accumulated on the up-stream side of these bars that the diamonds are collected. The diamonds are nearly all colourless with the forms of hexakis-octahedra, tetrakis-hexahedra, rounded rhombic-dodecahedra, or very rarely octahedra. The panned residues contain quartz, rutile, tourmaline, staurolite, ilmenite, haematite, magnetite, garnet, anatase, brookite, kyanite, and apatite, all much water-worn. Experiments were made on the relative wearing hardness of these minerals by placing cut cubes of each in a rotating drum. L. J. S.

LE GRANGE (J. M.). *The Barbara beryls: a study of an occurrence of emeralds in the north-eastern Transvaal, with some observations on metallogenetic zoning in the Murchison Range*. Trans. Geol. Soc. S. Africa, 1930, vol. 32 (for 1929), pp. 1-25, figs. 4.

Emerald and beryl were discovered in 1927 in the Leydsdorp district in biotite- and amphibole-schists which have been invaded by granite. Between the schist and granite there is an irregular belt of pegmatite, containing quartz, microcline, muscovite, and tourmaline, with apatite and small red garnets near the schist wall. The beryl crystals are usually dihexagonal prisms, the emeralds are always

hexagonal prisms with rough, pitted surfaces. Many of the crystals are zoned, colourless or pink layers alternating with green ones. The zones may be parallel either to the prism or to the base. S. J. S.

CODAZZI (Ricardo Lleras). *Minas de esmeraldas*. Boletín de Minas y Petróleos, Colombia, 1929, vol. 1, pp. 114–143, 7 figs.

An account of the history, occurrence, and associated minerals of the emerald mines near Muzo. Other Colombian emerald mines briefly described, with sketch-maps of the localities, are those of Coscuez, La Chapa, Alumbra, Camancha, and Somondoco. [M.A. 1–334, 3–129, 3–440.] L. J. S.

KERR (Paul F.). *An artificial gem-stone isomorphous with spinel*. Amer. Min. 1929, vol. 14, pp. 259–264, 2 figs.

An examination of artificial spinels containing an excess of alumina [M.A. 4–70]. The hardness is 8 and $n_{Na} \pm 1.721$. X-ray powder photographs show a pattern identical with that of spinel from Ceylon, the spacings $2d_{100}$ being 4.00 and 4.02 respectively. Analysis I of a rose-pink stone, II bluish-green, III pale blue, and IV of ruby-spinel from Ceylon.

	Al ₂ O ₃ .	Cr ₂ O ₃ .	FeO.	MnO.	MgO.	CaO.	SiO ₂ .	TiO ₂ .	Total.	Sp. gr.
I.	87.50	nil	0.82	trace	10.66	0.06	0.62	nil	99.66	3.48
II.	89.17	—	—	—	9.69	—	—	—	—	3.57
III.	88.95	—	—	—	9.70	—	—	—	—	3.71
IV.	70.00	0.39	0.45	trace	28.10	0.06	0.74	0.10	99.84	—

L. J. S.

SCHLOSSMACHER (K.). *Die Absorption des Lichtes bei synthetischen blauen Spinellen*. Zeits. Krist., 1930, vol. 74, pp. 41–48, 2 figs.

Measurements were taken of the degree of absorption of light of all wave-lengths in the visible spectrum by various kinds of blue spinels. Marked differences were found between the natural spinels and the bluish-green types of artificial crystals, which differed in their turn from synthetic spinels of cobalt-blue colour. H. H.

HEINZ (Herbert). *Die Entstehung der Achate, ihre Verwitterung und ihre künstliche Färbung*. Chemie der Erde, 1930, vol. 4, pp. 501–525, 1 pl., 14 text-figs.

LINCK (G.) & H. HEINZ. *Ergebnisse der Arbeit des Herrn H. Heinz über die Achate*. Ibid., pp. 526–528.

The different layers in agates from various localities were examined chemically, optically, and by X-rays. Analyses are given of the

white weathered crust and of the fresh agates; e. g. flint from the English Chalk gave I for the inner black portion, and II for the white chalk-like crust.

	SiO ₂ .	(Fe,Al) ₂ O ₃ .	(Mg,Mn)O.	CaO.	Ign.	Sp. gr.
I.	97.93	0.27	0.20	0.59	1.25	2.596
II.	96.72	0.28	0.09	1.71	1.68	2.501

The portion soluble in 10% KOH solution, taken to represent admixed opal, varies in the different bands of an agate from Madagascar from 12.66 to 30.69%, with a corresponding range in sp. gr. from 2.616 to 2.601; and in a Brazilian agate from 5.02 to 13.48 % with sp. gr. 2.620 to 2.595. Artificial colouring, by soaking in sugar solution for 14 days and then in concentrated sulphuric acid, was effected in the finer grained layers containing more opal, rather than in porous weathered layers. The fine fibres of quartz shown in micro-sections often have negative elongation. X-ray photographs show some lines different from those of quartz. Banded and tubular structures, similar to those seen in agates, were obtained experimentally by the interaction of silicic acid sols and salt solutions. The banding of agate is attributed to the alternating action of solutions of silicic acid and of salts, the former during the dry season and the latter during the wet season of the year. L. J. S.

CLINTON (H. G.). *Vashegyite and barrandite from Nevada*. Amer. Min., 1929, vol. 14, pp. 434-436.

Various aluminium phosphates (utahlite, turquoise, vashegyite) occur with opal, jarosite, francolite, &c., in a vein in altered slate near porphyry in the Vashegyite gem mine at Manhattan. The vashegyite is white to yellowish-white and the barrandite is green, yellow, or red. L. J. S.

MURGOCI (G.) [1872-1925]. *Les ambres roumains, leur importance scientifique et économique.—The Roumanian ambers, their scientific and economic importance*. Correspondance économique roumaine, Bulletin officiel, Ministère de l'Industrie et du Commerce, Bucarest, 1924, vol. 6. no. 6, pp. 3-25, 6 figs. (French and English in parallel columns.)

A general account is given of the occurrence and properties of Romanian amber (romanite). It occurs in sandstones and shales of Upper Oligocene age, which form a zone, extending from Galicia to Oltenia, around the Carpathians; but it is mainly near Coltzi and other places in the district [judet] of Buzău that the amber is mined.

Less important localities are known in the districts of Râmnicu-Sărat, Putna, and Neamțu. It is mined in small pits and galleries, which do not extend far owing to the tilting and dislocation of the amber-bearing bed. A small amount is collected in streams. The amber itself is usually much fissured, and is very often friable and powdery ('burnt' amber). It is associated with carbonaceous matter and is of detrital origin. A large number of colour varieties are distinguished—yellow, brown, deep red, to black; and many specimens show a distinct fluorescence. Owing to the fissuring of the material special light effects are given by reflection, and inclusions are common. Specific gravity 1.03–1.12, n 1.4377. The melting-point is high, 330–350° C. Analyses: I, mean of several of yellow Buzău amber; II, 'burnt' amber from Buzău; III, black amber from Buzău; IV, almashite, clear green, from Piatra; V, almashite, black, from Piatra; VI, munténite from Olănești; VII, mean of several analyses of Danzig (Baltic) amber.

	I.	II.	III.	IV.	V.	VI.	VII.
C ...	79.92	81.64	83.29	82.15	79.45	85.42	78.63
H ...	10.19	9.65	10.77	10.94	10.23	11.46	10.48
O ...	8.19	7.56	4.45	2.57	3.00	2.55	10.47
S ...	1.21	1.15	0.93	0.33	1.40	0.54	0.42
Ash...	0.49	—	0.56	3.51	5.52	0.03	—

The name 'almashite' is given to bluish-green, brown to nearly black amber with a strong fluorescence from the Almaș (Almash) valley near Piatra in district Neamțu. 'Munténite' [Min. Mag, **21**–572] is from beds of Eocene age at Olănești in district Vâlcea; yellowish to brown with strong fluorescence; sp. gr. 1.094, melting-point 165° C. The output in 1923 of Romanian amber is estimated at 150 kg. of good pieces and 250–300 kg. of grain and powder amber. The largest piece mentioned weighs 3,204 grams. L. J. S.

Mathematical Crystallography.

SCHUBNIKOW (A.) [= SHUBNIKOV (A.)]. *Über die Symmetrie des Kontinuums*. Zeits. Krist., 1929, vol. 72, pp. 272–290, 3 figs.

A discussion is given of those groups of movements in which all points equivalent to a given point fill continuously the whole of one-, two-, or three-dimensional space. The movements include screw-axes in which the angle of rotation is infinitesimal. Applications from the theory of electricity, optics, and elasticity are appended.

H. H.

SCHUBNIKOW (A.) [= SHUBNIKOV (A.)]. *Über die Symmetrie des Semikontinuums*. Zeits. Krist., 1930, vol. 73, pp. 430-433, 1 fig.

There are 31 symmetry-groups of a two-dimensional semicontinuum, discontinuous in one direction, such as a family of equally spaced coplanar parallel lines. There are 80 groups for a three-dimensional semicontinuum of the first sort continuous in one direction only, and an infinite number of groups for a three-dimensional semicontinuum of the second sort continuous in two independent directions, such as a family of equally spaced parallel planes. H. H.

HEESCH (H.). *Zur systematischen Strukturtheorie. II*. Zeits. Krist., 1929, vol. 72, pp. 177-201, 7 figs.

An exposition of the well-known theory of space-groups with special emphasis on the subgroups of the various groups concerned. [M.A. 4-155.] H. H.

HEESCH (H.). *Zur systematischen Strukturtheorie. III. Über die vierdimensionalen Gruppen des dreidimensionalen Raumes*. Zeits. Krist., 1930, vol. 73. pp. 325-345, 9 figs.

— — — *IV. Über die Symmetrien zweiter Art in Kontinuen und Semidiskontinuen*. Ibid., pp. 346-356, 19 figs.

A continuation of the author's previous exposition of the symmetry-groups of two- and three-dimensional semi-continuous and discontinuous media [M.A. 4-155, and preceding abstract]. H. H.

MOTZOK (D.). *Substitutionentheorie als Analyse der Symmetriellehre. (II. Symmetrie der unendliche Systeme.)* Zeits. Krist., 1929, vol. 72, pp. 249-271, 7 figs.

A symmetry-movement permutes the faces of a regular figure or of an infinite system of such figures, thus giving rise to a permutation on the symbols denoting the faces. Hence with each space-group is associated a permutation-group. The author uses this idea to obtain the well-known space-groups, extending here to infinite groups the work relating to finite groups published in an earlier paper [M.A. 4-154]. H. H.

MOTZOK (D.). *Komposition und Transformation in der Symmetriellehre*. Zeits. Krist., 1930, vol. 73, pp. 434-441, 3 figs.

A discussion of the composition of geometrical movements (rotations, &c.) and their relation to permutations of symbols. H. H.

BECKE (Friedrich). *Über Systematik und Nomenklatur der 32 Symmetrieklassen der Krystalle*. Anzeiger Akad. Wiss. Wien, Math.-naturwiss. Kl., 1929, vol. 66, pp. 311–318.

Further discussion on the derivation of the 32 crystal-classes from the elements of symmetry [M.A. 3-414-9, 4-53, 4-152]. A tabular arrangement showing the elements of symmetry is compared with that of F. Rinne. In place of the hybrid words 'Plangyroide' and 'Punktgyroide', Becke suggests 'Stilbogyroide' ($\sigma\tau\iota\lambda\beta\eta$, reflecting face) and 'Stigmogyroide' ($\sigma\tau\iota\gamma\mu\alpha$, point) with the symbols b and g respectively. The Hexastilbogyroide (dolomite) class is then $6b$, and the Hexastigmogyroide [trigonal bipyramidal] class $6g$. L. J. S.

ITO (Teiichi). *Isogonale Polyeder und Partikelgruppen*. Zeits. Krist., 1929, vol. 70, pp. 393–459, 29 text-figs.

— *Berichtigung zu der Arbeit*, „Isogonale Polyeder und Partikelgruppen“. Ibid., 1929, vol. 71, pp. 536–538.

A theoretical study of isogonal polyhedra and particle groups developed from Niggli's topological structure analysis [M.A. 4-52].

F. A. B.

GIANNOTTI (Carlo). *Il tracciamento degli assi nei cristalli geminati*. Atti (Mem.) Soc. Toscana Sci. Nat., 1929, vol. 39, pp. 51–61, 9 figs. [Author's preprints dated 1928.]

The author's application of nomograms to crystal-drawings is extended to twin-crystals with practical examples. [M.A. 4-55.]

F. A. B.

WRIGHT (F. E.). *The preparation of projection diagrams*. Amer. Min., 1929, vol. 14, pp. 251–258, 3 figs.

The equations of the maps of small and great circles are obtained for 'projections' in which the azimuthal angles on the sphere and the plane of projection are the same, while the polar distance in the projection varies as $\sin \rho$, $\tan \frac{1}{4}\rho$, $\tan \frac{1}{2}\rho$, $\tan \rho$, or $\tan 2\rho$, &c., where ρ is the angular distance from the pole on the sphere. H. H.

PARSONS (A. L.). *The determination of the crystallographic constants in the triclinic system*. Amer. Min., 1929, vol. 14, pp. 154–159, 3 figs.

From two-circle measurements plotted on a gnomonic projection, formulae and graphical constructions are given for determining the angular and linear constants of a triclinic crystal with relative ease.

L. J. S.

PEACOCK (Martin A.). *Two-circle and three-circle co-ordinate angles.*

Amer. Min., 1929, vol. 14, pp. 332-335, 2 figs.

Simple formulae are given connecting the angles measured on two-circle and three-circle goniometers [Min. Mag., **13**-312]. L. J. S.

KALB (Georg). *Typische vierseitige Vizinalpyramiden auf parallekantigen viereckigen Grundflächen holödrischer Kristalle.* Zeits.

Krist., 1930, vol. 73, pp. 266-269, 7 figs.

Sketches are given of the seven possible arrangements of four vicinal faces on a crystal-face whose shape is a parallelogram or rectangle, with examples drawn from observations on various minerals. H. H.

KALB (Georg). *Die morphologische Bedeutung der dreiseitigen Vizinalpyramiden auf dreieckigen Grundflächen.* Zeits. Krist., 1930, vol. 74, pp. 205-212, 10 figs.

There are theoretically five different types of triangular vicinal pyramids on a triangular crystal-face. These are illustrated by actual occurrences on natrolite, quartz, apophyllite and analcime, pyrite, galena, and alum. H. H.

Chemical Crystallography.

LAVES (Fritz). *Die Bau-Zusammenhänge innerhalb der Kristallstrukturen. I. Teil.* Zeits. Krist., 1930, vol. 73, pp. 202-265, 15 figs. *II. Teil.* Ibid., pp. 275-324, 3 figs.

The author develops the theory of crystal-structure from a consideration of the assemblages of particles which form the constituents of a crystalline medium, and applies it to the aggregates formed by various chemical elements. H. H.

BECK (G.). *Der energetische Aufbau der Moleküle.* Zeits. Anorg. Chem., 1929, vol. 182, pp. 332-342.

From the density of a compound, the density of its elements, and the heat of formation, the total energy of the compound may be calculated. The sum of this and the heat of reaction is a quantity proportional to the interionic field, and, valencies of the various atoms (or radicles) being known, it is possible to decide whether the linkages are polar or non-polar. The agreement of the conclusions with experimental results for fused salts and with the conclusions based on X-ray structure for solids, is good. M. H. H.

LOWRY (T. M.) & VERNON (M. A.). *The electronic theory of valency.—Part VII. The etch figures of sylvine.* Trans. Faraday Soc. London, 1929, vol. 25, pp. 286–291, 2 pls. Phil. Mag., 1930, ser. 7, vol. 9, pp. 233–240, 2 pls.

Hettich's conclusions on the holohedral symmetry of sylvine are confirmed [M.A. 3–332]. When natural crystals are etched with a strong solution of potassium chloride, unsymmetrical pyramids are sometimes formed by the flotation of detached fragments, but on artificial crystals the etch-figures are always symmetrical even in the presence of optically-active impurities. The authors, however, were unable to develop unsymmetrical etch-figures, whereas Hettich could only ensure their absence by taking special precautions. The high conductivity of the fused salt is also adduced as evidence for the ionic structure of sylvine. A similar argument in the case of water would appear to throw suspicion on the ionic structure of ice, and the authors also object to the structure of quartz, calcite, baryte, &c. They suggest that the oxygen atoms in the carbonate, nitrate, sulphate, and silicate ions are linked to the central atom by single bonds and therefore carry only single negative charges. [W. L. Bragg has recently published evidence to show that oxygen and silicon in the tetrahedral group SiO_4 are only partially ionized.]

F. A. B.

NEUHAUS (A.). *Über anomale kristallisierte Mischsysteme mit nur organischen Komponenten sowie mit einer anorganischen Wirt- und einer organischen Gastkomponente.* Chemie der Erde, 1930, vol. 5, pp. 529–553, 2 figs.

Various inorganic salts when crystallized from solution may take up organic colouring matters; e.g. barium, lead, and strontium nitrates readily take up methylene blue; sodium and potassium chlorides take up murexide; and potassium sulphate takes up ponceau red and Bismarck brown. Similar anomalous crystals are also formed by certain pairs of organic compounds, e.g. naphthalene and dihydronaphthalene. Crystals of this kind are considered in detail especially from a structural point of view.

L. J. S.

NEUHAUS (A.). *Über anomale kristallisierte Mischsysteme von Typus des sogenannten Eisensalmiaks.* Chemie der Erde, 1930, vol. 5, pp. 554–624, 1 pl. 10 text-figs.

Ammonium chloride may take up varying amounts of $\text{FeCl}_3 \cdot \text{H}_2\text{O}$ (up to 7.5 %), giving distorted cubic crystals showing optical

anomalies. Crystals of a similar nature are formed with $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$ (up to 19 %) and $\text{NiCl}_2 \cdot 2\text{H}_2\text{O}$ (up to 14 %). It is considered that these are not double salts nor true mixed crystals, but rather represent the inclusion of foreign matter along certain faces in the ammonium chloride crystals. The systems $\text{FeCl}_3\text{--H}_2\text{O}$, $\text{CoCl}_2\text{--H}_2\text{O}$, and $\text{NiCl}_2\text{--H}_2\text{O}$ were also studied in this connexion and data are given for some new crystallized hydrates. L. J. S.

SPANGENBERG (K.) & NEUHAUS (A.). *Künstlich gefärbte Kristalle als Beispiele sogenannter anomaler Mischkristalle und ihre mineral-chemische Bedeutung*. Chemie der Erde, 1930, vol. 5, pp. 437–528.

A detailed review is given of artificially coloured anomalous mixed crystals (e. g. iron chloride in ammonium chloride, methylene blue in lead nitrate, &c.) and of the influence of such substances in solution on the habit of the crystals. It is considered that these are not true mixed crystals, but represent an inclusion of foreign material adapted to the structure of the host. In this connexion the composite crystals formed by the regular intergrowths of various minerals and salts are considered in detail from a structural point of view; and a long [but not complete] index of such intergrowths is given, with references to the literature. L. J. S.

TAMMANN (G.) & OELSEN (W.). *Die Abhängigkeit der Konzentration gesättigter Mischkristalle von der Temperatur*. Zeits. Anorg. Chem., 1930, vol. 186, pp. 257–288, 22 figs.

A method is worked out for the determination of the solubility of a ferromagnetic metal in a non-ferromagnetic one, based on the fact that the homogeneous mixed crystals have a very low magnetic susceptibility. The method is applied to the determination of the solubility of Fe and Co in Cu, Pb, Ag, and Bi, of Fe in Cd, and of Ni in Ag and Pb at a series of temperatures; and it is shown that the variation in the concentration of the saturated mixed crystal with temperature is much greater than has hitherto been supposed, and follows an exponential law. M. H. H.

RAKUSIN (M. A.). *Über das Verhalten von unbeschädigten Glaubersalzkristallen gegen kalten Äthyl- und Methylalkohol*. Zeits. Krist., 1930, vol. 73, pp. 115–116.

Crystals of Glauber's salt, $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$, lose their water of crystallization when left in excess of pure ethyl or methyl alcohol

for many hours. In ethyl alcohol the crystals fall to powder, but in methyl alcohol the anhydrous sulphate retains the original form of the hydrated salt.

F. A. B.

RAKUSIN (M. A.). *Über die Kristallhydrate der Mellithsäuresalze und deren Bedeutung für die Theorie der Bindung des Kristallwassers.* Zeits. Krist., 1930, vol. 73, pp. 270-273.

The salts of mellitic acid form stable hydrates of the anionic type. Many contain very large numbers of water molecules and their theoretical significance is discussed.

F. A. B.

FAJANS (K.). *Zur Frage der Stabilität der Hydrate von Salzen.* Zeits. Krist., 1930, vol. 73, pp. 273-274.

A note on the ionic theory of the stability of hydrates of salts. The high power of hydration of the mellitic acid salts [preceding abstract] is difficult to explain on the electrostatic theory.

F. A. B.

PABST (Adolf). *On the hydrates of sodium carbonate.* Amer. Min., 1930, vol. 15, pp. 69-73.

On evaporating at room temperature (about 18°C.) a mixed solution of sodium and potassium carbonates there is an early separation of large (several cm.) well-formed crystals of the hemipentahydrate $\text{Na}_2\text{CO}_3 \cdot 2\frac{1}{2}\text{H}_2\text{O}$. These are orthorhombic and gave measurements agreeing with the axial ratio $a : b : c = 0.794 : 1 : 0.439$ of J. Morel, 1889. Sp. gr. 2.053; α 1.435, β 1.492, γ 1.547, 2V large, negative. The monohydrate has sp. gr. 2.255.

L. J. S.

MACHATSCHKI (Felix). *Die Kristallgestalt des Kaliumperrhenates KReO_4 .* Zeits. Krist., 1930, vol. 72, pp. 541-542.

Potassium perrhenate forms very small crystals of the tetragonal system with ratio of crystallographic axes $a : c = 1 : 1.5823$, bounded chiefly by the forms (101) and (111). They are optically positive, and the refractive indices are given approximately by ϵ 1.67, ω 1.64.

H. H.

KRACEK (F. C.). *The polymorphism of sodium sulfate: I. Thermal analysis.* Journ. Physical Chem., 1929, vol. 33, pp. 1281-1303, 9 figs.

KRACEK (F. C.) & GIBSON (R. E.). *The polymorphism of sodium sulfate: II. The densities of anhydrous sodium sulfate at 25°.* Ibid., pp. 1304-1308.

Heating and cooling curves between 190° and 250° C. point to the existence of five modifications of sodium sulphate, some of which are

pseudo-monotropic. Thenardite (Na_2SO_4 V; d 2.664) when heated above 200°C . and again cooled passes through a cycle of inversions, leaving a stable form (Na_2SO_4 III; d 2.697) with optical properties different from those of thenardite. L. J. S.

MÜLLER (K. H. Heinz). *Über die Spaltbarkeit von Bleichlorid-Kristallen.* Zeits. Krist., 1930, vol. 74, pp. 100–102, 3 figs.

Lead chloride has a perfect cleavage parallel to (001). Less complete cleavages parallel to (100) and (010) were also observed. Contrary to the usual opinion, there is probably no difference in cleavage between crystals derived from solution and from cooling of molten PbCl_2 . H. H.

CHUDOBA (K.). *Über die kristallographischen und optischen Eigenschaften der in Leclanché-Elementen gebildeten Zinkchloridammine.* Centralblatt Min., Abt. A, 1929, pp. 139–143, 1 fig.

Hexagonal crystals of $\text{ZnCl}_2 \cdot 6\text{NH}_3$ and orthorhombic crystals of $\text{ZnCl}_2 \cdot 2\text{NH}_3$, found in a Leclanché cell, are described. L. J. S.

Artificial Minerals.

WÖHLER (Lothar). *Über Platinarsenid.* Zeits. Anorg. Chem., 1930, vol. 186, pp. 324–336, 1 fig.

Platinum and arsenic combine with explosive vigour at a moderate temperature to give sperrylite, PtAs_2 , as small octahedra with sp. gr. 11.8. Excess arsenic is preferably used in the synthesis, and subsequently distilled off. No evidence was found of the existence of another arsenide of platinum. The various older processes for the preparation of platinum arsenides were studied, and shown to give mixtures of variable composition. M. H. H.

EARDLEY-WILMOT (V. L.). *Abrasives. Products of Canada: technology and application. Part IV, Artificial abrasives and manufactured abrasive products and their uses.* Canada, Dept. Mines, Mines Branch, Ottawa, 1929, no. 699, vii + 144 pp., 19 pls., 14 text-figs. Price 20 cents. [Cf. M.A. 4–79.]

Gives details of the process of manufacture of silicon carbide (carborundum) and fused alumina (artificial corundum); and of the use of these and other materials for the construction of grinding-wheels and the preparation of coated papers and cloths. L. J. S.

BILTZ (Wilhelm) & LEMKE (Alfred), Röntgenaufnahmen von MEISEL (Karl). *Über Molekular- und Atomvolumina*. 22. *Über γ -Tonerde und Spinelle*. Zeits. Anorg. Chem., 1930, vol. 186, pp. 373-386, 2 figs.

The density, range of existence, relative solubility in acids, and hygroscopicity of the γ -modification of alumina have been investigated in more detail. Attributing to the magnesia of spinel a share of the molecular volume and molecular refractivity equal to those of cubic MgO, the alumina's share in a pure spinel and a series with excess of alumina [M.A. 4-70] equals the molecular volume and refractivity of γ -Al₂O₃. This is taken to indicate that the volume relations of oxygen and aluminium in the spinels are the same as in γ -alumina. As in organic chemistry, the interpretation of molecular volumes involves many assumptions. The alumina-spinels of NiO, CoO, FeO, MnO, and CdO are interpreted on a basis of γ -alumina and the cubic monoxides, but the corresponding chrome- and iron-spinels call for hypothetical γ -Cr₂O₃ and γ -Fe₂O₃, while in the zinc-spinels and chrysoberyl, hypothetical cubic ZnO and BeO are called in. It is suggested (without evidence) that ferromagnetic Fe₂O₃ is 'probably' the γ -form. M. H. H.

WEYL (W.). *Ueber die Bildung des Magnesiaferrites in Sintermagnetsteinen*. Tonindustrie-Zeitung, 1929, vol. 53, pp. 559-562, 3 figs.

The examination of thin sections of sinter containing magnesia from the lining of chemical furnaces shows that the iron content is partly dissolved in the glassy groundmass and that the rest is probably combined as magnesium ferrite. Attempts to synthesize this compound all failed, but powder photographs of a mixture of magnesium and ferric oxides heated to a temperature of 1250° C. clearly show the formation of a spinel compound. F. A. B.

HÜTTIG (Gustav F.) & KOSTELITZ (Oskar). *Beiträge zur Kenntnis der Oxydhydrate*. XX. *Das System Aluminiumoxyd-Wasser*. Zeits. Anorg. Chem., 1930, vol. 187, pp. 1-15, 6 figs.

From a study of the isobaric dehydration curves and Debyeograms of a number of alumina preparations it is concluded that the initial amorphous precipitate, with little combined water, may with about equal probability crystallize as the monohydrate böhmite, or take up more water and crystallize as hydrargillite. Böhmite is not stable in presence of water, but absorbs it, and passes over in a continuous manner, without loss of its crystalline character, into hydrargillite, either direct, or with intermediate production of bayerite.

Bayerite ($\text{Al}_2\text{O}_3 \cdot 2.5\text{H}_2\text{O}$) is comparatively stable, but also hydrates slowly to hydrargillite. The initial amorphous precipitate may also take water into combination without crystallization. Both monohydrates, böhmite and diasporé, occur naturally. Böhmite gives γ -alumina on dehydration, while diasporé gives corundum. M.H.H.

EITEL (W.) & SKALIKS (W.). *Hochdrucksynthesen von Carbonaten und Silicaten*. Die Naturwissenschaften, 1929, vol. 17, pp 316–319, 3 figs.

An apparatus is described for melting carbonates and silicates at 900–1000° C. under pressures of 1200–1300 atmos. [M.A. 3–174]. The compounds $\text{Na}_2\text{CO}_3 \cdot \text{MgCO}_3$, $\text{K}_2\text{CO}_3 \cdot \text{MgCO}_3$, $\text{Na}_2\text{CO}_3 \cdot \text{Li}_2\text{CO}_3$, and $\text{K}_2\text{CO}_3 \cdot \text{Li}_2\text{CO}_3$ were prepared under high CO_2 -pressure. The symmetry of these compounds is hexagonal. Sodium-lithium carbonate is of particular interest. This salt is formed in needles, belongs to the space-group D_{3h}^1 or D_{3h}^3 , and its unit cell contains only three molecules. The only structure similar to that of dolomite is found in the sodium-magnesium salt which has the symmetry of the group C_{3i} . The potassium-magnesium salt is formed as a glass which becomes crystalline (hexagonal) on heating to 200–400° C. It has not yet been possible to make any measurements on this interesting glass.

F. A. B.

POSNJAK (E.) & TUNELL (G.). *The system, cupric oxide-sulphur trioxide-water*. Amer. Journ. Sci., 1929, ser. 5, vol 18, pp. 1–34, 7 figs.

A detailed study of the equilibrium and saturation curves of the system $\text{CuO}-\text{SO}_3-\text{H}_2\text{O}$ at temperatures of 50°, 100°, and 200° C. Equilibrium is attained very slowly, and in one case was not complete after the sealed tubes had remained in the thermostat for 2½ years. The minutely crystallized products were analysed chemically and examined optically and by X-ray methods, and were compared with natural minerals. The eight crystalline phases found include: CuO (monoclinic, tenorite); three basic sulphates, $4\text{CuO} \cdot \text{SO}_3 \cdot 3\text{H}_2\text{O}$ (orthorhombic, brochantite), $3\text{CuO} \cdot \text{SO}_3 \cdot 2\text{H}_2\text{O}$ (orthorhombic, antlerite), and $3\text{CuO} \cdot 2\text{SO}_3 \cdot 5\text{H}_2\text{O}$ (triclinic); and the normal sulphates, CuSO_4 (orthorhombic, hydrocyanite), $\text{CuSO}_4 \cdot \text{H}_2\text{O}$, $\text{CuSO}_4 \cdot 3\text{H}_2\text{O}$ (monoclinic-clino-hedral), and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (triclinic, chalcantite).

L. J. S.

SCHARIZER (Rudolf). *Das Ferrisulfat-Tetrahydrat* [i. e. Ferrosulfat].

Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 263–266.

Crystals of $\text{FeSO}_4 \cdot 4\text{H}_2\text{O}$ usually show vicinal faces and readily alter to the monohydrate. Measurement of good crystals gave $a : b : c =$

0.43797 : 1 : 0.58715, $\beta = 89^\circ 29'$; forms m (110), n (120), o (130), b (010), q (011), u (021), s (031); cleavage (010) perfect. Sp. gr. 2.2775. Optic axial plane and $Bx_o \perp$ (010), negative, $2V$ large, α 1.533, β 1.535.
L. J. S.

FAIRCHILD (J. G.). *Base exchange in artificial autunites*. Introduction by W. T. SCHALLER. Amer. Min., 1929, vol. 14, pp. 265–275.

Crystalline scales of autunite were obtained by the slow diffusion of solutions of calcium and uranium nitrates into phosphoric acid. Quicker results were obtained by a 'salting out' process when a strong solution of sodium chloride is added. The product was then found to be a sodium-autunite with only little calcium. In the presence of an excess of calcium chloride, however, a pure calcium-autunite was obtained. This can be changed to sodium-autunite, $Na_2O \cdot 2UO_3 \cdot P_2O_5 \cdot nH_2O$, by digesting with sodium chloride; and sodium-autunite is changed to calcium-autunite by digesting with calcium chloride. Further, by digesting sodium-autunite with various chlorides the corresponding K, Ba, Mn, Cu, Ni, Co, and Mg compounds were obtained. A lead-autunite was prepared by the slow precipitation from dilute solutions. The crystals of these various autunites show considerable variations in their optical characters, due largely to the different degrees of hydration.
L. J. S.

GRUNER (Erhard). *Untersuchungen an Alkali-Aluminium-Silicaten*. I. *Synthetische Studien am Nephelin*. Zeits. Anorg. Chem., 1929, vol. 182, pp. 319–331, 5 figs.

A study of the synthesis of nepheline and kaliophilite from paragonite and muscovite respectively by the action of dilute aqueous alkali under pressure at various temperatures gave the lower limit of reaction as about $200^\circ C$. Ignited mica shows an induction period of about 24 hours before reaction begins. The difference between this limit and the figure of J. Koenigsberger and W. J. Müller [M.A. 1–234] for the synthesis from other silicates ($330^\circ C$.) is explained by the aluminosilicic acids of nepheline and the micas being the same, so that the reaction is merely the neutralization of an acid salt. The reverse reaction was also studied; kaliophilite and water gave muscovite in small quantities at about $400^\circ C$., but the conversion of nepheline to paragonite did not succeed. In all the experiments zeolites (natrolite, &c.) were obtained. From kaolin and soda, at 800 – $1000^\circ C$., two definite silicates were produced, nepheline (identified

with R. Hoffmann's 'Grundsilicat *a*' of the ultramarine process, 1902), and a more basic compound, $2\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ (R. Hoffmann's 'Grundsilicat *b*'). The latter is hydrolysed by water to the 'nepheline hydrate' of J. Lemberg (1887) and S. Thugutt (1895), $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot \text{H}_2\text{O}$. Nepheline crystals up to $\frac{1}{4}$ mm. were obtained from kaolin and soda by the use of sodium metavanadate as flux. M. H. H.

WELLS (Francis G.). *The hydrothermal alteration of serpentine*. Amer. Journ. Sci., 1929, ser. 5, vol. 18, pp. 34-52, 1 fig.

Experiments with olivine in the presence of water and various reagents (CO_2 , Na_2CO_3 , SiO_2) at temperatures up to 520°C . and 267 atmos. pressure show no indications of alteration to serpentine. But serpentine may be formed from magnesium carbonate rocks or from magnesium solutions by the action of silicifying solutions at 375°C . and 219 atmos. L. J. S.

DITTLER (E.). *Mineralsynthetische Studien am Sapphirin*. Zeits. Anorg. Chem., 1928, vol 174, pp. 342-354, 1 pl., 2 text-figs.

Sapphirine shows an incongruent melting-point at 1500°C . with decomposition into spinel, fibrolite, and a siliceous glass containing a little alumina: $\text{Mg}_5\text{Al}_{12}\text{Si}_2\text{O}_{27} = 5\text{MgAl}_2\text{O}_4 + \text{Al}_2\text{SiO}_5 + \text{SiO}_2$. Attempts to synthesize the mineral by heating a mixture of MgO , Al_2O_3 , SiO_2 , and a little FeO at 1400 - 1500° also yielded spinel, fibrolite, and silica-glass, even when boric acid was added as a mineralizer. The occurrence of sapphirine in metamorphic rocks suggests that the presence of water under high pressure is necessary for the formation of the mineral. L. J. S.

DITTLER (Emil). *Zur Frage der Oxydationsstufe des Titans in den Silikaten*. Sitzungsber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1, 1929, vol 138, pp. 371-411, 3 pls. 2 text-figs.

An attempt to determine the state of oxidation of titanium in titanaugites, titanolivines, and melanites by comparison of natural and synthetic products. Titanaugites containing the titanium as TiO_2 , as Ti_2O_3 , and partly as both, were successfully synthesized. All three series were similar optically, and agreed with the natural red-violet titanaugites of Hundorf, Jakuben, and the Kahler Berg in every respect except that they were all colourless. They were quite different optically from the green titanaugites of Bausenberg and the Laacher See trachyte, which do not differ from non-titaniferous augites in optical properties. The colour of titanaugites was

reproduced by a sintered mixture of Ti_2O_3 with Fe_2O_3 , FeO , Mn_2O_3 , or MnO . Titanolivines were synthesized, containing the titanium as TiO_2 and as TiO ; they showed higher refractive indices and stronger dispersion of the optic axial angle than normal olivines, but were quite colourless. The TiO_2 and TiO series were similar in all respects. These products, having the normal optical orientation of olivine, are essentially different from the natural titanolivines, which are really clinohumites. While the titanaugites and titanolivines melt congruently and solidify to a homogeneous mass, the mixture of oxides having the composition of melanite (with the titanium partly as TiO_2 and partly as Ti_2O_3) solidifies to a mixture of a titaniferous iron spinel, melilite, and sphene. But from a melt in excess of sodium chloride, imperfect dodecahedra of melanite were obtained. X-ray studies showed that FeO and Ti_2O_3 react when sintered together to form a spinel, with cell-side $a = 8.47 \text{ \AA}$.; Ti_2O_3 and Fe_2O_3 do not react when sintered together, but form an isomorphous mixture.

M. H. H.

SCHWARZ (Robert) & REIDT (Erich), (*Die optischen Untersuchungen von K. CHUDOKA*). *Zur Kenntnis hochschmelzender keramischer Massen. Eine Untersuchung über die Systeme Kaolin-Tonerde-Feldspat und Kaolin-Zirkondioxyd-Feldspat*. Zeits. Anorg. Chem., 1929, vol. 182, pp. 1-18. 7 figs.

A study has been made of the softening-point curves in the three component systems kaolin-alumina-orthoclase and kaolin-zirconia-orthoclase. The coefficients of expansion of the sintered products of the first series and their porosity and resistance to fused sodium and potassium carbonate were also determined. Microscopic examination of the products showed that in those sintered at 1170°C ., the felspar and alumina were unaltered, while the kaolin had given rise to fibrolite and glass. At 1300°C . the felspar was fused to a glass, with alumina and much fibrolite. At 1400°C . and higher, only glass and fibrolite were visible, the proportion of the latter increasing with the temperature required for sintering.

M. H. H.

Topographical Mineralogy.

GOUGH (J. W.). *The mines of Mendip*. Oxford (Clarendon Press). 1930, x+269 pp., 2 pls. Price 15s.

The author, who is Lecturer in History at the University of Bristol, has brought together all the available documentary evidence relating

to mining and mining laws in the Mendip Hills, Somersetshire, and the result is an interesting and readable book. An outline is also given of what is known of the working for lead by the Romans. Pigs of lead and Roman coins found on the spot cover the period A. D. 49–379. The earliest document is a charter dated 1189. Lead mining reached its highest point in 1600–70, and ceased in 1815. At a later period, 1860–1908, the vast accumulations of slags and slimes left by the earlier workers yielded much lead. Another quite distinct phase was the mining for calamine (wholly smithsonite), which commenced on Worle Hill in 1566 and was finished in the western Mendips by 1850. At one time this calamine was sold by grocers in London at 28s. to 56s. per hundredweight. Heated with charcoal and copper in a melting pot, it yielded brass. Some few other minerals—manganese and iron ores, ochre, and barytes—have been mined on a small scale. The statement is made (p. 4) that mendipite was ‘discovered in 1823 at Dolbury Hill’ [near Churchill]. As a matter of fact it was found in 1823 in a Stockholm collection, the specimens having been collected probably more than a hundred years earlier [Min. Mag. 20–68–71]. As a point of criticism, it may be mentioned that dates are only rarely given in the copious foot-note references, though these can generally be traced from the bibliography of 7 pages at the end of the volume. In bibliography, as well as in history, dates are of the first importance. L. J. S.

List of quarries in Great Britain and the Isle of Man: year 1928.

Mines Department, London, 1930, vi + 454 pp. Price 35s.

The quarries are listed under counties, giving the name and situation of each, name of owner, number of persons employed, and material quarried. There are indexes of the names of quarries, and of owners, and a mineral index of materials. L. J. S.

NASINI (Raffaello). *I soffioni e i lagoni della Toscana e la industria boracifera.* Roma, 1930, xi + 658, pls. and text-figs.

This large profusely illustrated volume has been privately printed. It gives a detailed account of the history and conditions of the boric acid industry from the fumaroles and lagoons in Tuscany, more particularly at Larderello. The high-pressure steam issuing from the fumaroles is used as a source of power. Chapters are given on the properties of boric acid (sassolite) and of cerbolite (boussingaultite).

L. J. S.

MILLOSEVICH (F.). *Brevi notizie di mineralogia italiana*. Periodico di Mineralogia, Roma, 1930, vol. 1, pp. 152-154, 1 fig.

Ematite nello sperone di Trevignano sul lago (Vulcano Sabazio). (pp. 152-153).—Small lamellar crystals of haematite occur in cavities in the altered leucitic lava (locally called 'sperone') of the Rocca di Trevignano, Bracciano lake. It is of solfataric origin, and the vapours of ferric chloride have at the same time caused the 'speronization' of the rock.

Valentinite di Su Suergiu nel Gerrei (Sardegna). (pp. 153-154).—Crystals on another specimen differ in habit from those described in 1900. They show the forms $b(010)$, $c(001)$, $p(110)$, $Q(032)$.

L. J. S.

PELLOUX (A.). *Plancheite di Arenas* (Sardegna). Periodico di Mineralogia, Roma, 1930, vol. 1, p. 154.

Finely fibrous radiating spherules of plancheite are associated with tetrahedrite, malachite, chessylite, spangolite, and dufrenite in a gangue of quartz.

L. J. S.

FRAGA TORREJÓN (Eduardo de). *Notas sobre mineralogía asturiana*. Bol. R. Soc. Española Hist. Nat., 1929, vol. 29, pp. 181-188.

Short notes on 44 mineral-species from prov. Asturias are given as additions and corrections to S. Calderón, 'Los minerales de España' (1910).

L. J. S.

HIBSCH (J. E.). *Erläuterungen zur geologischen Karte der Umgebung von Brüx*. Knihovna Státního Geol. Ústavu Československé Republiky, 1929, vol. 11, 102 pp., 1 geol. map (scale, 1 : 25,000), 2 pls., 13 text-figs. [Cf. M.A. 3-540.]

In the neighbourhood of Brüx (= Most) Miocene fresh-water deposits with extensive beds of lignite are partly covered by flows of nepheline-basalt and sodalite-tephrite and basalt-tuffs, and are intruded by plugs of phonolite with phonolite-tuffs. Various zeolites are found in the phonolites, and good crystals of whewellite have been found in the lignite. Marcasite and gypsum are abundant in the lignite and associated clays. Hainite is present in all the nepheline-phonolites.

L. J. S.

BLAKE (G. S.). *The mineral resources of Palestine and Transjordan*. Jerusalem [Public Works Department], 1930, 41 pp. Price 100 mils.

A short outline is given of the geology of Palestine and of Transjordan. The most important mineral product is given by the Dead

Sea brine, which is rich in potassium chloride, magnesium chloride and bromide, probably largely derived from hot springs. Experimental production of the salts by solar evaporation in large pans yielded first sodium chloride, then carnallite, and lastly magnesium chloride with bromide (MgBr_2 1.46 %). Pure KCl can be separated by recrystallization from the carnallite. Petroleum, bitumen, and bituminous limestone are also of some importance. In Transjordan there are small deposits of copper and iron ores, and considerable amounts of gypsum and phosphate. L. J. S.

ADAMS (Frank Dawson). *The geology of Ceylon*. Canadian Journal of Research, 1929, vol. 1, pp. 425-465, 467-511, 1 map, 9 pls., 2 text-figs.

A summary is given of the scattered literature, and from his own observations made in 1924-5 and 1927 the author is able to give the first geological map of Ceylon (scale, 1 inch = 13 miles about). Except for an area of Miocene limestones in the extreme north of the island, all the rocks are crystalline and of pre-Cambrian age and form the portion of a large syncline. They are largely quartzose biotite-gneisses in which are two great beds of white crystalline limestone with fibrolite-garnet-rocks (khondalite) of sedimentary origin. Charnockite with associated more basic rocks and granulites (leptynites) are also represented. Petrographical descriptions with several new chemical analyses are given of these rocks. Minerals of economic value, thorianite, mica, graphite, and gem-stones, are briefly referred to, with reference to the author's earlier papers on these [M.A. 3-141, 189]. L. J. S.

Uganda Protectorate. *Annual Report of the Geological Survey Department for the year . . . 1928*. Entebbe, 1929, 43 pp., 1 map. Price 3s.

This report contains a brief account of augite crystals from Lulinzalwe Hill, Belgian Congo, near the Uganda border; a brief note on lateritization; a preliminary note on the occurrence and blowpipe reactions of the new bismuth tantalate [since described as bismutotantalite, Min. Mag., vol. 22, p. 185]; and notes on the cassiterite deposits occurring in a muscovite-kaolin vein and in pegmatite at Mwirasando. There is also a preliminary account of the leucitic lavas of the Bufumbira volcanic field, north-east of Lake Kivu, and a new record of the occurrence of ijolite at Lokupoi Hill in Karamoja. W. C. S.

JUNNER (N. R.). *Geology and mineral resources of Sierra Leone*. Mining Mag. London, 1930, vol. 42, pp. 73-82, 6 figs.

The mountainous peninsula of the Colony consists of gabbros and norites in which are thick bands of ilmenite and titanomagnetite. The latter give rise to extensive deposits of black sands which carry platinum. The largest nugget of platinum found weighs 4.7 grams. Analysis gave Pt 87, Ir-Os 1.3, Pd 2.0, Fe 9.9 %. More than half of the area of the Protectorate is occupied by granite. There are also crystalline schists and ancient sediments. Lateritic iron ores were formerly worked by the natives, and extensive deposits of high-grade iron ore have recently been discovered. Other recently discovered deposits are of gold, chromite, manganese ore, corundum, bauxite, &c. Chemical analyses are given of iron ores, titanium ores, and bauxite.

L. J. S.

SCHOEP (A.). *Les minéraux du gîte uranifère du Katanga*. Ann. Musée Congo Belge, Ser. I. Minéralogie, Tervueren (Belgique), 1930, vol. 1, fasc. 2, 43 pp., 1 pl., 16 text-figs.

The Kasolo radium mine, discovered in 1915, is situated on Kasolo hill (11° 3' S., 26° 33' E.), 22 km. SSW. of Kambove. Two kilometres to the NE. is a hill called Shinkolobwe (or Chinkolobwe) in which there is a copper vein. These two mines are on the same mining block, and the latter name has sometimes been applied also to the radium mine. The uranium ore occurs in veins 20-30 cm. thick in bedded dolomites and slates. In addition to uraninite and torbernite, the author has described twelve new species of uranium minerals from this locality, viz. becquerelite, curite, dewindtite, dumontite, fourmarierite, ianthinite, kasolite, parsonsite, renardite, schoepite, sklodowskite, soddyite. Other minerals present in the vein are quartz, talc, magnesite, heterogenite, linnaeite, gold, wulfenite, and monazite. The present paper gives detailed mineralogical descriptions of each of these minerals, collected from the author's earlier papers [M.A. 1-244, 2-50, 3-6, 4-15, &c.]. Some of the new uranium minerals are well represented on a coloured quarto plate.

L. J. S.

BRIÈRE (Mlle Y.). *Notes sur quelques minéraux malgaches*. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 85-88.

A description of uraninite, scheelite, fibrous torendrikite, beryl, grossular, sapphire, sapphirine, spinel, and topaz from various localities in Madagascar.

F. A. B.

CANDEL VILA (Rafael). *Notas acerca de algunos minerales de Canarias*. Mem. R. Soc. Española Hist. Nat., 1929, vol. 15, pp. 265-268, 5 figs.

Crystals of olivine in sand from Tenerife show the forms *a m s k a* [Dana's letters]. Brilliant black crystals of hornblende from Tenerife show the forms *c b a m d u*, (111), (131), and are usually twinned on (100). L. J. S.

HAWKINS (A. C.). *New and interesting minerals from central New Jersey*. Amer. Min., 1929, vol. 14, pp. 309-311, 3 figs.

Various minerals are briefly described from basalt quarries. Native copper as plates and small crystals *a o f* and new (245). Chalcosine as simple crystals *v p m b* [Dana's letters] and new (10.3.0). Several zeolites are mentioned. Covelline as small bright blue plates from the Arlington copper mine near Newark is a new species for New Jersey. L. J. S.

HALTOM (William L.). *Magnet Cove, Arkansas, and vicinity*. Amer. Min., 1929, vol. 14, pp. 484-487, 2 figs.

A new road-cut has given fresh exposures, and other places where minerals can be now collected are mentioned. A list of 52 minerals recorded from this locality is added. L. J. S.

ORCEL (J.) & PLAZA (Gil Rivera). *Étude microscopique de quelques minerais métalliques du Pérou*. Deuxième note. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 91-107, 9 pls.

A continuation of the study of polished sections of ores from several mining districts in Peru. [M.A. 4-184, 3-400.] F. A. B.

ROMERO (Genaro). *Nuestra riqueza minera*. Republic del Paraguay, Cartilla Informativa no. 18, Asunción, 1930, 70 pp.

A brief sketch is given of the rocks and minerals of Paraguay, with special mention and chemical analyses of ores of iron and manganese. A list of localities is given stating the rocks and minerals from each. The mining laws are set out in detail, but there appear to be no mines. [M.A. 4-184.] L. J. S.

SIMPSON (Edward S.). *Contributions to the mineralogy of Western Australia. Series IV*. Journ. Roy. Soc. W. Australia, 1929, vol. 15, pp. 99-113, 4 figs. [Cf. M.A. 3-544, 4-9.]

(1) Apatite, Mt. Francisco, N.W. Division.—Large coarsely crystalline masses of dark-grey apatite gave P_2O_5 41.92, Al_2O_3 0.45, FeO 0.36, MnO 0.19, CaO 53.74, MgO 0.58, F 2.74, Cl 0.06, CO_2 0.06, SiO_2

0.64, $\text{H}_2\text{O} + 0.46$, $\text{H}_2\text{O} - 0.04$; sp. gr. 3.196. This gives the usual formula $\text{Ca}_5(\text{F},\text{OH})(\text{PO}_4)_3$ with $\text{F}:\text{OH}$ about 3:1. The replacement of CaF_2 by CaO in 'oxy-apatite' (voelckerite) is doubted. (2) Caesium-beryl, Wodgina, N.W. Div.—Large blocks (10 kg.) of a massive white mineral, closely resembling quartz but showing an imperfect cleavage, gave analysis I. A massive grey beryl, from the same vein of albite-pegmatite carrying lithium minerals and tantalite, gave II.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	BeO .	Li_2O .	Na_2O .
I.	66.42	17.97	nil	nil	nil	nil	0.30	11.20	0.82	1.01
II.	60.58	14.55	1.39	trace	0.07	1.18	3.98	12.00	0.97	1.12

	K_2O .	Cs_2O .	CO_2 .	$\text{H}_2\text{O} +$.	Total.	Sp. gr.	ω .	ϵ .
I.	trace	0.72	nil	2.20	100.64	2.72	1.581	1.575
II.	trace	0.92	0.02	3.00	99.78	2.79	1.588	1.582

(3) Cinnabar, Marble Bar, N.W. Div.—Small water-worn fragments from alluvial gold workings. (4) Glaucophane, chalybite, and corundum, Greenbushes, S.W. Div.—Prospect bores for tin ore in albite-pegmatite yielded bluish-grey glaucophane, with sp. gr. 3.15, $c:\gamma = 4-6^\circ$, α 1.624, β 1.637, γ 1.640, and pleochroism α colourless to very pale-amber, β purplish-blue, γ deep cobalt-blue. The occurrence of chalybite in a pegmatite is unusual. (5) Ilmenite.—Fragments on the surface at Woodstock, N.W. Div., probably derived from pegmatite, gave anal. III; sp. gr. 4.63. This manganiferous variety of ilmenite is named 'manganilmenite'. At Wannamal, S.W. Div., massive granular ilmenite is found as large surface boulders, probably from segregations in epidiorite; anal. IV shows Fe_2O_3 and FeTiO_3 in approximately equal amounts, and for this variety of ilmenite the name menaccanite is retained.

	TiO_2 .	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	H_2O .	Total.
III.	51.79	0.80	—	12.12	21.27	14.40	trace	nil	trace	100.38
IV.	22.79	1.35	5.28	49.93	19.76	trace	trace	nil	0.60	99.71

(6) Manganocolumbite.—Analyses and sp. gr. of material from three localities. (7) Microlite.—Grey alluvial pebbles from Wodgina consist of colourless to pale-yellow isotropic material; analysis gave Ta_2O_5 77.00, Nb_2O_5 3.64, TiO_2 0.51, SnO_2 0.37, SiO_2 0.40, Al_2O_3 0.55, Fe_2O_3 0.72, FeO 0.47, MnO 0.11, MgO nil, CaO 12.78, Na_2O 1.18, K_2O 0.15, F 1.09, $\text{H}_2\text{O} + 2.00$, sp. gr. 5.77; this deviates somewhat from the formula $\text{CaTa}_2\text{O}_6.\text{NaF}$, indicating that the material is weathered. At Green's Well microlite occurs as an alteration product of tapiolite. (8) Pseudomorph after spodumene, Ubini, Central

Division.—Analysis of dull white subfibrous material, similar to 'cymatolite', from a pegmatite, indicates a mixture of felspar, quartz, and mica. (9) Spinel.—Green grains in an olivine-rock and in sands are recorded from two localities, (10) Tourmaline.—Analyses of material from three localities. (11) Idocrase, Tambourah, N.W. Div.—Coarsely crystallized brownish-black prisms gave SiO_2 36.75, TiO_2 2.17, B_2O_3 nil, Al_2O_3 16.51, Fe_2O_3 2.73, FeO 3.00, MnO 0.33, MgO 1.55, CaO 35.28, Na_2O 0.12, K_2O 0.10, Li_2O 0.06, $\text{H}_2\text{O} +$ 1.25, F 1.80, sp. gr. 3.42, agreeing with a formula $\text{Ca}_{12}\text{Al}_6\text{Si}_{10}(\text{OH},\text{F})_4\text{O}_{39}$.
L. J. S.

Zeolites.

PARKER (Robert L.). *Ueber einige schweizerische Zeolithparagenesen*. Schweiz. Min. Petr. Mitt., 1923, vol. 2, pp. 290–298.

A study of paragenetic relations of the zeolites in the Aar and St. Gotthard massifs. The zeolites are almost exclusively lime-zeolites—chabazite, stilbite, scolecite, heulandite, and apophyllite, faujasite and milarite being rare. The zeolites favour the lime-rich rocks, provided there is a sufficiency of alkalis. Stilbite and chabazite are rare, other zeolites very rare in the St. Gotthard massif, where such parageneses as adularia, quartz, *haematite*, muscovite, or adularia, quartz, *apatite*, muscovite, calcite, chlorite prevail. The series adularia, quartz, calcite, chlorite, stilbite occurs at Schipshaus. In the Aar granites, the series is in general adularia, quartz, fluorite, calcite, *zeolites*, chlorite, while in the diorites sphene replaces fluorite. The italicized minerals are typical of their respective provinces. The order of the zeolites is somewhat variable, but chabazite, stilbite, scolecite, heulandite, apophyllite is usual, as at the Schattig-Wichel (Uri). The calcite phase may extend so far as to overlap the heulandite phase.

M. H. H.

KAPPEN (H.) & RUNG (F.). *Ueber den Ionenaustausch der zeolithischen Silikate bei Beteiligung hydrolytisch gespaltener Salze*. 1. Mitteilung. *Versuche mit Permutit*. Zeits. Pflanzenernährung, Düngung u. Bodenkunde, 1927, Teil A, vol. 8, pp. 345–373.

Attempts to secure base-exchange between sodium or calcium permutite and such highly hydrolysed salts as aluminium, ferric, and chromic chlorides or sulphates failed, the permutite being decomposed. A small but definite base-exchange was attained with ferrous sulphate, copper chloride, and zinc chloride, but was soon

brought to a stop by deposition of the hydroxide of the metal in the pores of the permutite. Lanthanum salts gave a normal, ready base-exchange. By treatment with dilute acids, the strong bases (Na_2O , CaO) are almost completely removed from permutite with very little alteration in the $\text{Al}_2\text{O}_3:\text{SiO}_2$ ratio, but the alumina is afterwards rapidly extracted. A sodium permutite was analysed: SiO_2 41.81, Al_2O_3 22.62, Na_2O 15.88, H_2O 20.62 %. M. H. H.

KAPPEN (H.) & FISCHER (B.). *Ueber den Ionenaustausch der zeolithischen Silikate bei Beteiligung hydrolytisch gespaltener Salze.* 2. Mitteilung. *Versuche mit natürlichen Silikaten.* Zeits. Pflanzenernährung, Düngung u. Bodenkunde, 1928, Teil A, vol. 12, pp. 2-37.

A study of the action of hydrolysed salts and of acids on chabazite, stilbite, heulandite, natrolite, analcime, serpentine, apophyllite, wollastonite, and talc. A small degree of base-exchange was obtained between ferrous sulphate and chabazite, stilbite, and heulandite, a more appreciable one between chabazite and copper chloride. Ferric, aluminium, and zinc chlorides were also tried, but in no other case could base-exchange be demonstrated, there being either no reaction or decomposition of the silicate. After treatment with acids, the zeolites will communicate acidity to a neutral salt solution, and will yield up alumina to it; analyses do not, however, indicate the formation of a free alumino-silicic acid, the alumina being removed as fast or faster than the bases.

			SiO_2 .	Al_2O_3 .	CaO .	K_2O .	Na_2O .	H_2O .	CuO .
Natrolite, Bohemia	44.76	30.07	2.28	—	13.97	9.47	—
Stilbite, Iceland	57.62	16.37	8.51	—	—	17.99	—
Apophyllite, Seiser Alp, Tyrol			52.95	3.90	28.05	3.37	—	12.99	—
Chabazite, Nova Scotia	...		56.37	16.11	6.37	1.83	1.19	18.56	—
Chabazite, treated with CuCl_2			55.57	15.33	2.00	0.69	0.38	19.61	7.15

M. H. H.

WEIGNER (G.) & MÜLLER (K. W.). *Beiträge zum Ionenumtausch besonders an Permutiten.* Zeits. Pflanzenernährung, Düngung u. Bodenkunde, 1929, Teil A., vol. 14, pp. 321-347.

The equilibrium point in the base-exchange reactions of permutite is independent of the dilution, not only when the ions involved have the same valency, but when they differ therein. The ions of higher valency are the more strongly absorbed. In aqueous solution the entry of the heavier, less hydrated ions is greater than that of the

lighter, more hydrated ions of the same valency; but in aqueous alcohol dehydration of the ions leads to a reversal of this behaviour. This effect is not due to the lower dielectric constant of alcohol solutions, since glucose, which can lower the dielectric constant as much as alcohol, has no effect on the equilibrium; sucrose is also inactive. Experiments showed that the adsorption of glucose and sucrose is, at most, very slight. Methylene blue partakes in base-exchange only in an extremely thin layer on the surface of the grains or on the walls of cracks, its large ions failing to penetrate the fine capillaries. An analysis by H. Jenny of an ammonium permutite gave: SiO_2 48.04, Al_2O_3 23.55, Fe_2O_3 1.05, $(\text{NH}_4)_2\text{O}$ 10.81, ignition 16.62, H_2O above [below ?] 110°C . 2.97 %. Numerous references to the scattered literature of this subject are given. M. H. H.

KUČERA (Bruno) & NOVOTNÁ (Božena). *Nová naleziště zeolithů na Moravě*. [New localities of zeolites in Moravia.] Časopis Moravského Zemského Musea, 1927, vol. 25, pp. 214–227 (Czech, with Germ. summary), 1 pl.

Natrolite in parallel growth with scolecite from Senorady near Náměšť. Analcime, stilbite, and heulandite, also analcime and prehnite pseudomorphous after laumontite, in the serpentine of Letovice. Heulandite and laumontite from Bludov, where scolecite and apophyllite have been previously known. Stilbite and laumontite on contact-metamorphic limestone from Rejhartice (= Reigersdorf). Laumontite, phillipsite, phacolite, chabazite, natrolite, and heulandite in fissures in amphibolite near Žilošice (= Schöllschitz). Phillipsite in serpentine at Smrčák; and some other minor occurrences. A complete list of old and new zeolite localities in Moravia and Czech Silesia is given. F. S.

D'ACHIARDI (G.). *Sul modo di formazione dei gruppi mimetici di dachiardite*. Rend. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1929, ser. 6, vol. 9, pp. 182–187, 15 figs.

— *La dachiardite zeolite mimetica dell'isola d'Elba*. Atti (Mem.) Soc. Toscana Sci. Nat., 1929, vol. 39, pp. 171–186, 19 figs.

In the first of these papers it is shown that the pseudo-tetragonal octets of dachiardite have a spirally zoned structure. Twinning occurs on (110) of the monoclinic individuals, with an angle $\alpha : \bar{a}$ of 46° till one circuit is completed. The last crystal forms an angle of

38° with the first, but projects farther from the centre. Further growth then takes place by deposition of another set of twinned individuals in parallel position with the first. Steps in the composition-planes of the twins, readily visible in sections between crossed nicols, demonstrate the spiral growth, which explains the frequent formation of hollow prisms. In the second paper, a survey of previous work [M.A. 3-286] on dachiardite is added to these observations.

M. H. H.

GALLITELLI (P.). *Sulla prehnite di Toggiano*. Atti (Mem.) Soc. Toscana Sci. Nat., 1928, vol. 38, pp. 267-273, 4 figs.

Globules of crystalline prehnite from Toggiano, Valle del Dragone, Modena, are accompanied by calcite and datolite. The crystals are small and very perfect, and show (001), (100), (110), (304), (103), (031), (041), (015), (049), and (0.10.3) ($a:b:c = 0.8401:1:1.1536$). The last four forms are new. The colour varies according to the iron-content from colourless to apple-green. The dehydration curve shows a loss of about 0.2 % of water at 230°, the rest not being lost till between 600 and 750°C. The analyses gave I for a colourless and II for a green specimen.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	CaO.	H ₂ O.	Total.	Sp. gr.
I.	43.08	25.12	trace	27.08	4.92	100.20	2.869
II.	41.92	23.34	2.62	27.74	5.04	100.66	2.891

M. H. H.

CAVINATO (A.). *Sulla mesolite*. Atti Soc. Ital. Sci. Nat. 1926, vol. 65, pp. 104-114, 1 pl., 2 text-figs.

Mesolite from Iceland was submitted to optical, goniometric, analytical, and X-ray study. The composition is SiO₂ 44.96, Al₂O₃ 26.30, CaO 11.15, Na₂O 4.10, H₂O 13.20, total 99.71. The crystals are interpenetration-twins with twin-plane a (100), similar to those described by Lacroix, Cesàro, and Bowman; and they gave excellent goniometric results in agreement with monoclinic symmetry, the b -axis being parallel to the elongation. $m(101): \underline{m}(101) 91^\circ 30'$; $m: O(111) 64^\circ 61'$; $O: \underline{O}(1\bar{1}\bar{1}) 37^\circ 25'$; $O: \underline{O}_1(\bar{1}\bar{1}\bar{1}) 34^\circ 10'$; $m: \underline{O} 91^\circ 28'$; $m: \underline{O}_1 88^\circ 27'$; $m: a 4^\circ$. a lies between m and \bar{a} . Lauegrams indicated the same symmetry, and the optical orientation is also in agreement. The optic axial plane is perpendicular to the elongation, and the sign positive, $2V 70^\circ$, $v > \rho$ strong, $Bx_a:c = 9\frac{1}{2}^\circ$. Double refraction very low. Lauegrams of natrolite and

scolecite indicated orthorhombic and monoclinic symmetry respectively. M. H. H.

CAVINATO (A.). *Sulla disidratazione dell'apofyllite*. Rend. R. Accad. Lincei, Roma, 1927, ser. 6, vol. 5, pp. 907-910, 1 fig.

The loss of water from apophyllite on heating is a very slow process, and the reabsorption still slower, but if sufficient time is given a smooth curve is obtained. The greater part of the loss occurs between 200 and 275° C. The optical properties are not altered before the material becomes opaque at about 280° C. M. H. H.

CAVINATO (A.). *Nuove osservazioni sulle zeoliti del gruppo della natrolite*. Mem. R. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1927, ser. 6, vol. 2, pp. 320-350, 3 figs.

Natrolite from Mori, Monte Baldo, Venetia (I); scolecites from Miage, Monte Bianco (II and II a), Maderanerthal, Switzerland (III), and from Teigarhorn, Iceland (IV); and mesolite from Berufjord, Iceland (V and Va) were analysed and studies of their dehydration curves made.

	I.	II.	IIa.	III.	IV.	V.	Va.
SiO ₂ ...	47.32	45.96	45.67	45.00	45.9	46.08	44.96
Al ₂ O ₃ ...	26.30	26.10	25.93	26.77	26.26	26.64	26.30
CaO ...	0.50	13.91	13.80	14.50	14.63	9.86	11.15
Na ₂ O ...	15.95	—	—	—	—	4.20	4.10
H ₂ O ...	9.50	13.97	14.41	13.67	13.77	13.30	13.20
	99.57	99.94	99.81	99.94	100.46	100.08	99.71

The dehydration of natrolite takes place sharply between 270 and 300° C., under an aqueous vapour-pressure of 8 to 10 mm., and is complete. The amount of water the dehydrated mineral can reabsorb depends both on the temperature and the time of dehydration; it may exceed the amount originally present. The crystal-structure breaks down about 900 to 1000° C. Scolecite loses one molecule of water between 160 and 180° C., and becomes converted into metascolecite, which has the axial plane and Bx_a normal to *b* (010) (= *a* (100) of scolecite), negative, $\gamma : c = 70^\circ$. Cleavage-flakes parallel to *m* (110) have positive elongation and an optic axis is visible inclined about 20° to the flakes. The transformation of scolecite to metascolecite is reversible, but between 340 and 360° C. the other two molecules of water are lost irreversibly. The new product has the same position of the optical ellipsoid as metascolecite, but the double refraction has fallen considerably, and the refractive indices

increased, β 1.541. At about 500° C. the crystalline structure breaks down. For the scolecite from Miage, $\gamma : c = 17^\circ$, $2V$ 35° , β 1.515, $\gamma = 1.517$, $\gamma' - \alpha'$ on $m(110)$ 0.08. Metamesolite, produced from mesolite in irreversible reaction at about 350° C. with loss of all the water, has its optic axial plane parallel to the elongation, and a negative bisectrix emerges slightly inclined to one of the cleavages. The crystal-structure breaks down at about 670° C. A reversible intermediate stage in the dehydration was observed, about half the water being lost near 240° C. The velocity of dehydration and rehydration was also studied. Lauegrams showed natrolite to be orthorhombic, scolecite and mesolite monoclinic, the latter with the symmetry-axis parallel to the elongation. Debyeograms showed no visible alteration for natrolite after dehydration, or for scolecite and mesolite after the first stage of dehydration, but a distinct difference was observed after the complete dehydration of mesolite and scolecite, and this is noted to correspond with the loss of the power of rehydration. The loss of water in two hours at 250° C. is suggested as a means of distinction; natrolite losing 1.5 %, scolecite 4.5 %, and mesolite 6.4 %.

M. H. H.

CAVINATO (A.). *Nuove ricerche sulle trasformazioni della scolecite*. Rend. R. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1928, ser. 6, vol. 7, pp. 670-672.

The temperature at which scolecite loses one molecule of water and becomes changed into metascolecite is now found to be 160-200° C., and is definitely bound up with the optical changes. The axial plane remains normal to $b(010)$ of scolecite ($= a(100)$ of metascolecite), but the angle $\alpha : c$ becomes 70-75°; α remains the acute bisectrix, but $2V_a$ becomes 65°, $\rho < v$. [Misprint? Axial plane becomes normal to $b(010)$ of metascolecite ($= a(100)$ of scolecite), and the angle $\gamma : c = 70-75^\circ$. The new α (former β) is the acute bisectrix, $2V_a$ 65°, $\rho < v$. Compare preceding abstract.] These properties are retained so long as the reabsorption of water is prevented; the reabsorption is very rapid provided the dehydration has been carried out below 200° C. At 335-345° C., the remaining two molecules of water are lost, and the anhydrous material undergoes a sudden change in the position of the axial plane, $\gamma : c$ becoming 85-88°, and the double refraction falls considerably. The optic axial angle remains at $2V_a$ 65°, negative, $\rho < v$. These characters are retained up to 550° C., at which temperature the crystal-structure breaks down. The second dehydration is not reversible. M. H. H.

GAUBERT (Paul). *Contribution à l'étude de la heulandite*. 1^{re} note. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 14-42, 3 pls., 5 text-figs.

The banded sectors, already studied by Rinne and others, observed in most crystals of heulandite are examined optically. The angle between the trace of the optic axial plane on (010) and the edge (010) : (001) is measured for each sector in a large number of crystals from various localities ; in most cases the optic axial angles are also recorded. The optic axial angle $2E$ varies, being generally largest in the sector $(\bar{2}01)$ and least in the sector (201) [Dana's axes] ; whilst the plane of the optic axes varies in position from sector to sector, and crystal to crystal. No correlation of chemical with optical variations has been achieved, but the latter are probably to be attributed to the differential distribution of foreign matter in the sectors. The indices of refraction are mostly higher for the sectors (001) than the sectors (201). The author is of opinion that the sectors (001) are richer in strontium or barium than the sectors (201), the latter being richer in sodium than the rest of the crystal.

F. A. B.

GAUBERT (PAUL). *Contribution à l'étude de la heulandite*. Deuxième note. Bull. Soc. Franç. Min., 1929, vol. 52, pp. 121-138, 2 figs.

Changes in the optical properties of specimens of heulandite when heated under different conditions are described. When heated in water or an inert liquid up to 100° C. the optic axial plane in general rotates in an anti-clockwise direction until the trace of the plane in (010) is parallel to the edge [010, 001]. The amount of rotation in each sector depends on the initial position of the plane, but eventually the optic axial plane tends to the same position throughout the whole crystal. The optic axial angle and the birefringence increase with rise of temperature, but the relative size of the optic axial angle in the different sectors remains the same as before [see preceding abstract]. The optical changes with temperature are not completely reversible. Crystals placed in a desiccator at room temperature for a long period show three distinct zones. The innermost zone retains its former optical properties, whilst the optic axial plane of the outermost zone is rotated through an angle of nearly 90°. The intermediate zone, corresponding to a loss of 1.68 % water, is almost uniaxial. Different sectors of the same crystal show slight differences

in rates of dehydration. The density of powdered heulandite heated in air to 500° C. has been measured at various temperatures. The density has a minimum value of 2.05 at about 200° C., corresponding to a water content of 3 molecules. Heulandite heated to temperatures below 200° C. retains its lower density indefinitely.

F. A. B.

BRAUNS (Adele) & BRAUNS (R.). *Die chemische Zusammensetzung von Harringtonit*. Centrblatt Min., 1924, pp. 545-548.

Two analyses were made of a 'harringtonite' from Larne, Co. Antrim, SiO₂ 41.34 (41.45), Al₂O₃ 30.44 (29.92), CaO 11.35 (11.15), Na₂O 5.20 (5.12), H₂O 12.12 (12.82), total 100.45 (100.46). The density was variable, 2.192 to 2.300. Optical study showed the presence of strongly doubly-refractive fragments with negative elongation and weaker doubly-refracting fragments with positive elongation. This might be interpreted as a mixture of natrolite (30 %) and thomsonite (70 %); or as thomsonite flakes lying on *a* and *b* respectively, when the material becomes a faroelite. No evidence is given that the material did actually correspond to Thomson's harringtonite.

M. H. H.

HODGE-SMITH (T.). *The occurrence of zeolites at Kyogle, New South Wales*. Rec. Australian Museum, 1929, vol. 17, pp. 279-290, 2 pls., 5 text-figs.

Zeolites and calcite occur in four flows of Tertiary basalt at Kyogle in the valley of the Richmond river [Rous Co., NE. New South Wales]. They are found in vesicles in the fresh rock, but are more abundantly developed in a brecciated portion of one of the flows where the rock is much altered. Chabazite (analysis I) forms simple or twinned rhombohedra *r*, but is mostly of the phacolite habit with the forms *r a t e s* [Dana's letters]. Rock cavities when opened contain alkaline water and the chabazite is clear and colourless, but on exposure to the air the crystals soon become cloudy and white. On immersing the crystals in water they regain their transparency. Calcite occurs in three habits: (1) Large (27 × 11 cm.) amber-coloured acute scalenohedra with marked zonal structure and coated with chabazite. (2) Small colourless crystals in small vesicles in the basalt. (3) Small amber-coloured rhombohedra on chabazite. Analcime (anal. II) and mesolite (anal. III). The paragenesis of the minerals is discussed.

	SiO ₂ .	Al ₂ O ₃ .	CaO.	Na ₂ O.	K ₂ O.	H ₂ O.	Total.	Sp. gr.
I.	46.89	19.96	7.64	3.92	0.18	22.05	100.64	2.099
II.	54.23	23.67	nil	13.81	trace	8.34	100.05	2.286
III.	44.40	26.53	11.48	3.72	—	[13.87]	100.00	—

L. J. S.

FAIRBANKS (Ernest E.). *Zeophyllite from Idaho with note on the determination of Mallard's constant.* Amer. Min., 1926, vol. 11, pp. 249-252.

Spherules (to $\frac{3}{8}$ inch diam.) of zeophyllite are found with pyrite, epidote, and chlorite along fissures in dolomite near a granite-pegmatite contact in the Salmon River district, Riggins, Idaho. The crystals of the radial aggregates show perfect (0001) cleavage and are fibrous parallel to a . $2E\ 0^{\circ}-33^{\circ}14'$, negative. In the determination of the optic axial angle, the Mallard constant for the microscope was determined on crystals of ammonium sulphate ($2E\ 84^{\circ}6'$). Dielectric constants, k , for the zeolites at $31^{\circ}C$. are: natrolite 11, analcime 13, crestmorite 17, chabazite 19, stilbite 22, zeophyllite 25, gmelinite >36 . Stilbite after being heated to $110^{\circ}C$. gave $k > 36$, without any change in the optical properties. It is suggested that in the zeolites water is held by 'secondary valence'.

L. J. S.

HEWETT (D. F.), SHANNON (Earl V.), & GONYER (Forest A.). *Zeolites from Ritter hot spring, Grant County, Oregon.* Proc. U.S. Nat. Mus., 1928, vol. 73, art. 16, 18 pp., 2 pls., 1 text-fig.

A series of specimens was collected in 1915 from cavities in vesicular Tertiary basalt and along a fault line along which the hot spring rises through basalt. Various associations are noted, and the order of succession is, as a rule, from the least siliceous to the most siliceous—calcite, chabazite, mesolite and pseudomesolite, analcime, stilbite, and rarely opal. Thomsonite (analysis I) is the most abundant; it shows variations in the optical characters, but attempts to separate different grades in heavy liquids were not successful. A finely fibrous zeolite is shown by optical tests to consist of two minerals identical in chemical composition—mesolite, with β elongation, $\beta\ 1.512$, anal. II; and pseudomesolite, with γ elongation, $\beta\ 1.510$ and very low birefringence, anal. III. Stilbite with $\alpha\ 1.488$, $\beta\ 1.498$, $\gamma\ 1.500$ gave IV. Analcime, $n\ 1.488$, gave V. Chabazite, $n\ 1.488$, biaxial positive with $2V$ about 30° , gave VI. Other minerals briefly described are diabantite, levyne (?), heulandite.

	SiO ₂ .	Al ₂ O ₃ .	CaO.	MgO.	Na ₂ O.	K ₂ O.	H ₂ O+.	H ₂ O-. ¹	Total.
I.	37.84	31.72	12.20	0.84	4.08	0.96	12.56	0.52	100.72
II.	42.02	28.94	10.46	0.06	3.24	1.92	13.20	0.64	100.48
III.	43.80	28.20	10.48	0.04	3.22	1.46	13.24	0.32	100.76
IV.	56.24	17.16	8.56	0.40	trace	0.32	16.80	0.96	100.44
V.	53.92	24.69	0.96	0.04	10.04	2.24	8.62	nil	100.51
VI.	47.56	20.40	10.52	0.20	0.32	0.92	16.28	3.44	99.64

¹ $\pm 110^{\circ} - 125^{\circ} \text{C.}$

L. J. S.

McCLELLAN (H. W.). *Laumontite from southern Oregon*. Amer. Min., 1926, vol. 11, pp. 287-288.

White silky laumontite fills small veins and cavities in serpentine from near Grants Pass, Cascade Mts. Sp. gr. 2.23; α 1.505, γ 1.513, $\alpha : c + 50^{\circ}$. Analysis by E. V. Shannon gave SiO₂ 50.64, Al₂O₃ 21.86, CaO 12.18, MgO 0.74, K₂O 1.34, Na₂O 0.42, H₂O (+110°) 12.01, H₂O (-110°) 1.58 = 100.77.

L. J. S.

WHEELER (E. P., 2nd). *Stellerite from near Juneau, Alaska*. Amer. Min., 1927, vol. 12, pp. 360-364.

Rosettes of bladed crystals occurring in crevices in iron-stained mica-schist are identified with stellerite (J. Morozewicz, 1909; from Commander Islands, Bering Sea). Approximate measurements gave $a : b : c = 0.982 : 1 : 0.762$. Cleavage (010) perfect, also (100) and (001). Optic axial plane (010), $\beta x_a \perp (001)$, $2V$ 38°, negative, α 1.488, γ 1.499.

L. J. S.

Miscellaneous.

SLAVÍK (František). *Nerosty karvinských sférosideritů*. The minerals of the Karvinná sphaerosiderites.] Sborník Přírodovědecké Společnosti v Moravské Ostravě, Moravská Ostrava, 1929, vol. 4 (for 1926-28), pp. 90-93.

The succession of minerals in the sphaerosiderite septaria in the coal mines at Karvinná, Czech Silesia, is the same as that in those of the Kladno coal basin in central Bohemia. (1) Quartz, rare as colourless crystals (absent at Kladno); (2) ankerite; (3) calcite; (4) sulphide ores, pyrite, chalcopyrite, and blende (but not millerite, which is characteristic of Kladno); (5) nacrite. Barytes and whewellite are absent at Karvinná. Analysis by A. Orlov of the nacrite gave: SiO₂ 44.22, Al₂O₃ 40.39, Fe₂O₃ 0.43, MgO 0.08, CaO 0.50, Na₂O 0.07, K₂O 0.23, H₂O (+105°) 14.22, H₂O (-105°) 0.09 = 100.23.

F. S.

MAŠTALÍŘ (Václav). *Recentní nerosty z karvinských dolů*. [Recent minerals from the mines of Karvinná.] Sborník Přírodovědecké Společnosti v Moravské Ostravě, Moravská Ostrava, 1929, vol. 4 (for 1926–28), pp. 183–190, 1 pl.

Besides calcite and gypsum, the coal mines of Karvinná, Czech Silesia, have yielded recent sulphates, viz. mirabilite, epsomite, and mixtures of aluminium and iron sulphates. [The descriptions given, with incomplete chemical analyses and no optical data, are insufficient to determine the species exactly.] F. S.

NOVÁČEK (Radim). *Chemické složení a fyzikální konstanty spessartinu z Puklic u Jihlavy*. [Chemical composition and physical constants of spessartine from Puklice near Jihlava.] Časopis Moravského Zemského Musea, 1930, vol. 27, preprint 4 pp.

The garnet of this recently discovered occurrence in Moravia [M.A. 3-547] has sp. gr. 4.212, n_{Li} 1.8066, n_{Na} 1.8131, n_{Ti} 1.8175, and gave an analysis SiO_2 36.83, TiO_2 0.12, Al_2O_3 20.70, Fe_2O_3 0.78, FeO 12.41, MnO 29.06, MgO 0.14, CaO 0.27, H_2O – 0.02 = 100.33, corresponding with spessartine 68.24, almandine 30.56, pyrope 0.47, grossular 0.73. F. S.

STROCK (Lester W.). *Spessartite from Avondale, Delaware County, Pennsylvania*. Amer. Min., 1930, vol. 15, pp. 40–42.

Selected material from a large crystal of spessartine, from pegmatite cutting granite-gneiss, gave sp. gr. 4.117, n 1.805, and analysis SiO_2 36.52, Al_2O_3 21.00, MnO 26.41, CaO 1.88 = 100.08, corresponding with spessartine 61.0, almandine 32.8, grossular 5.6 mol. %. There is no need to assume a 'blythite' molecule [M.A. 3-308, 458].

L. J. S.

[SERDYUCHENKO (D. P.) & CHIRVINSKY (P. N.)] Сердюченко (Д. П.) и Чирвинский (П. Н.). Палыгорскит и пирит в Трудовском руднике Донецкого бассейна.—SERDIŮČENKO (D.) (SERDJUTSCHENKO (D.)) et ČIRVINSKIJ (P.) (Tschirwinsky (P.)). *Sur la palygorskite et la pyrite de la mine Trudov dans le bassin du Donetz*. Докл. Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), Ser. A., 1928, pp. 367–370).

β -Palygorskite occurs in veins, 2.5–3.8 cm. thick, in the Trudovsky coal mine; analysis gave SiO_2 54.84, Al_2O_3 11.37, Fe_2O_3 2.57, MgO 8.53, CaO 1.72, H_2O + 12.94, H_2O – 8.21 = 100.18, sp. gr. 2.357, agreeing with the formula $H_{10}Mg_2Al_2Si_7O_{24}.4H_2O$. The palygorskite

encloses minute crystals of pyrite, and in the vicinity there is a vein, (18 cm. thick) of pyrite.

P. N. C.

SERDINTSCHENKO (D.) [i.e. SERDYUCHENKO (D. P.), Сердюченко (Д. П.)].

Über die Nontronite aus zwei südrussischen Graphitlagerstätten.

Centralblatt Min., Abt. A, 1929, pp. 47-55.

In the Stary-Krym graphite mine near Mariupol seams of nontronite occur in the pyroxene-graphite-gneiss. It is dark olive-green or sometimes with a yellowish tinge, and when fresh is greasy to the touch. When air-dried it becomes brittle with a hardness rather greater than 1. Under the microscope it shows irregular overlapping plates with basal cleavage and distinct pleochroism, α clear yellow, β brownish-yellow, γ yellow-green; $2V\ 31^\circ$, negative. The mineral is decomposed by strong hydrochloric acid with separation of silica. Analyses I and II (II on purer material with less admixed quartz, chlorite, and graphite), give the ratios $1R''O.4.4R'''_2O_3.15.2SiO_2.16.3H_2O$ and $1R''O.4.3R'''_2O_3.11.6SiO_2.15.7H_2O$ respectively, with $SiO_2 : R_2'''O_3 = 3.48$ and 2.70 . In published analyses $SiO_2 : R_2'''O_3$ ranges from 3.65 to 2.24, on either side of the ideal formula $Fe_3O_3.3SiO_2.nH_2O$. In the graphite deposit in basic crystalline rocks at Petrovsk, in the Krivoy-Rog district, dark-green to clear-yellow nontronite is much mixed with kaolin. The minute scales are optically negative with $2V\ 29^\circ$ and feeble pleochroism. Analysis III agrees with $1R''O.4.R'''_2O_3.13.5SiO_2.15.6H_2O$. Here alumina is in excess and the mineral approaches the other end of the beidellite-nontronite series. In these occurrences the nontronite has perhaps been derived by the direct decomposition of iron-bearing silicates (pyroxene and amphibole); or it may have been formed by the action of solutions of iron sulphate (from the decomposition of pyrite) on the secondary kaolin.

	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .	MgO.	CaO.	H ₂ O+.	H ₂ O-.	Total.
I.	49.75	10.06	22.06	0.25	2.68	6.44	9.43	100.67
II.	42.74	9.76	26.71	1.06	1.94	6.74	10.42	99.37
III.	49.50	16.18	13.08	0.61	2.57	9.35	7.76	99.05

L. J. S.

NOLL (W.). *Zur Kenntnis des Nontronits.* Chemie der Erde, 1930, vol. 5, pp. 373-384, 6 figs.

E. Weinschenk (1897) regarded nontronite as analogous to kaolin and he gave the formula as $H_4Fe_2Si_2O_9$, but very few analyses agree with such a formula. Dehydration curves and X-ray powder photo-

graphs also show no relation to kaolin. The water is 'zeolitic'. A new analysis of green greasy nontronite from Tachau, Bavaria, gave SiO_2 40.02, Al_2O_3 10.55, Fe_2O_3 26.16, FeO 1.37, H_2O 21.83 = 99.93, corresponding with the ratios $\text{R}_2\text{O}_3 : \text{SiO}_2 : \text{H}_2\text{O} = 1 : 2.49 : 4.53$.

L. J. S.

PONDAL (Isidro Parga). *Estudio químico de la nontronita de Chenlo (Pontevedra).—Mineral nuevo para España.* Archivos do Seminario d'Estudos Galegos, Seizón de Cencias, 1929, vol. 2, pp. 9-14.

Analysis of the air-dried nontronite gave: SiO_2 39.00, Al_2O_3 7.15, Fe_2O_3 29.44, H_2O - 15.24, $\text{H}_2\text{O} + 9.01 = 99.84$. At 110°C . 15.24 % of water is lost and there is no further loss at 250° ; the remainder being lost at a red-heat. Over sulphuric acid there is a loss of 12.70 % and in water a gain of 5.08 %. Neglecting water lost at 110° the analysis corresponds with the formula $\text{Fe}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$.

L. J. S.

DUPARC (L.) & GYSIN (M.). *Notices minéralogiques. Les minéraux de la pegmatite de Mangualde.* Schweiz. Min. Petr. Mitt., 1927, vol. 7, pp. 32-34.

Pegmatite veins in granite near Mangualde, Beira Alta, Portugal, consist of quartz, orthoclase, and white mica, with beryl as an accessory constituent. Beryl as pale bluish or yellowish hexagonal prisms (5 or 6 cm. long) with sp. gr. 2.72, ω_{Na} 1.5768, ϵ_{Na} 1.5714, gave analysis I. Orthoclase, with extinction on (010) + $7\frac{1}{2}^\circ$ to the trace of (001), and optic axial plane \perp (010), gave analysis II. White mica, with $2V_{\text{Li}}$ $42^\circ 34'$, $2V_{\text{Na}}$ $41^\circ 30'$, $2V_{\text{Ti}}$ $40^\circ 58'$, gave III.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	Na_2O .	K_2O .	H_2O .	Total.
I.	65.49	19.38	0.67	—	trace	0.22	0.35	0.20	—	0.80	100.61*
II.	63.68	17.14	trace	—	—	trace	trace	1.09	16.35	0.85	99.11
III.	43.65	33.58	3.60	0.91	0.29	1.63	trace	4.51	7.45	3.25	100.92

* I, includes BeO 12.58; II, Li_2O trace; III, TiO_2 0.05.

W. C. S.

KRANCK (E. H.). *A beryl-bearing pegmatite from Uuksu in Carelia (E. Finland).* Compt. Rend. Soc. Géol. Finlande. no. 1, in: Bull. Comm. Géol. Finlande, 1929, no. 85, pp. 70-77.

A dike 30 cm. wide in granite-gneiss, and probably connected with the neighbouring rapakivi-granite, consists largely of prisms

(4-5 cm.) of beryl closely packed in biotite and with much dark-violet fluorite. In one part of the dike a reddish-brown felspar is abundant. Pyrite, calcite, and epidote are rare, and quartz is absent. The clear yellowish-green beryl has sp. gr. 2.677, ϵ 1.5723, ω 1.5783. The green biotite, sp. gr. 3.156, $2E$ $6-8^\circ$, β 1.632, gave on analysis SiO_2 35.92, TiO_2 trace, Al_2O_3 18.40, Fe_2O_3 9.12, FeO 21.62, MgO 0.72, CaO 1.28, Na_2O 0.30, K_2O 10.06, H_2O 2.97 = 100.39. It grades into a brownish biotite with $2E$ $2-3^\circ$. The reddish-brown felspar is oligoclase with the form of long six-sided prisms (*b m M*), sp. gr. 2.665, α' 1.541, γ' 1.545, extinction on $b + 3^\circ$, on $c + \frac{1}{2}^\circ$; CaO 5.34 %, BeO nil. Pegmatites are seldom found in connexion with the rapakivi-granites, and the type now described is unusual.

L. J. S.

GEDNEY (E. K.) & BERMAN (Harry). *Huge beryl crystals from Albany, Maine*. Rocks and Minerals, Peekskill, N.Y., 1929, vol. 4, pp. 78-80, 3 figs.

A nest of ten huge beryl crystals together with many smaller ones with a radial grouping has been exposed in a felspar quarry. The largest is 18 feet long and 4 feet in diameter and is estimated to weigh 18 tons. The beryl is pale apple-green and more or less cloudy to opaque, but some fragments of aquamarine and golden-beryl have been found. Rose-quartz of fine quality and in masses 6 or 8 feet across is also present.

L. J. S.

PALACHE (Charles) & BAUER (L. H.). *On the occurrence of beryllium in the zinc deposits of Franklin, New Jersey*. Amer. Min., 1930, vol. 15, pp. 29-33.

Beryllium was detected spectroscopically in 1912 in willemite from Franklin Furnace, and it is now found as an essential constituent of the two minerals—idocrase and berylite—in which it has hitherto been mistaken for aluminium. These minerals are of later formation in the ore-body, due to the action of granite-pegmatites, and their occurrence is of interest at the present time now that beryllium ores are in demand. Idocrase as brown slender prisms (*a m p*) embedded in a granular mixture of willemite, garnet, &c., gave $c : a = 0.5303$, sp. gr. 3.385, ω 1.712, ϵ 1.700. Analysis, SiO_2 34.25, Al_2O_3 (with FeO trace) 9.70, BeO 9.20, MgO 3.17, CaO 33.15, MnO 4.84, ZnO 4.86, H_2O 1.31 = 100.48, agrees closely with the

formula $2(\text{Mg}, \text{Mn}, \text{Zn})\text{O} \cdot 6\text{CaO} \cdot 4\text{BeO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$. The reason why other analyses of idocrase do not give simple ratios is perhaps because beryllium has been previously overlooked. The blue cyprine variety from Franklin Furnace also shows spectroscopically strong lines of beryllium. Barylite occurs as white plates embedded in hedyphane, with willemite, &c. Attention was directed to it by its vivid blue fluorescence in ultra-violet rays. It shows good cleavages (001) and (100); sp. gr. 4.066; α 1.695, β 1.702, γ 1.708 (β and γ perpendicular to the cleavages), $2V$ 70° , negative. Analysis, SiO_2 36.42, BaO 46.49, BeO 15.77, FeO 0.19, MgO 0.29, ZnO trace, PbO 0.11, H_2O 0.40 = 99.67, agrees closely with the new formula $2\text{BeO} \cdot \text{BaO} \cdot 2\text{SiO}_2$ for barylite from Långban, Sweden [G. Aminoff, M.A. 2-411].

L. J. S.

PIAZZA (Maria). *Idocrasio dei proietti dei Sabatini*. Periodico di Mineralogia, Roma,¹ 1930, vol. 1, pp. 8-37, 4 figs.

A detailed description is given of the small brown or green crystals of idocrase, found with garnet, pyroxene, wollastonite, calcite, &c., in ejected blocks at the Sabatini volcanoes [near Lake Bracciano, Lazio]. Twenty-four forms are noted, of which (401), (501), (513), and (10.9.0) are new [$a:c = 1:0.5370$]. Sp. gr. 3.43-3.46, and of crystals of type II 3.36-3.38. A yellowish-green crystal gave ω 1.726, ϵ 1.722 for yellow light.

L. J. S.

TILLEY (C. E.). *An association of afwillite and spurrite*. Geol. Mag. London, 1930, vol. 67, pp. 168-169, 2 figs.

Minute ($\frac{1}{2}$ mm.) crystals of afwillite were found with calcite in a spurrite contact-rock at Scawt Hill, Larne, Co. Antrim. They are tabular on (100) and elongated along the b -axis; α 1.617, β 1.620, γ 1.632; optic axial plane (010), $\alpha:c = 30^\circ$. Afwillite ($2\text{H}_2\text{CaSiO}_4 \cdot \text{Ca}(\text{OH})_2$) is a derivative of spurrite ($2\text{Ca}_2\text{SiO}_4 \cdot \text{CaCO}_3$). L. J. S.

DÍAZ TOSAOS (F.). *Un notable ejemplar español de piritita de hierro*. Mem. R. Soc. Española Hist. Nat., 1929, vol. 15, pp. 13-15, 2 pls.

Acicular crystals of iron-pyrite forming a confused aggregate of fan-shaped groups were found at Mercadal, in the Reocin mining district, Santander. Some larger crystals show distinctly the form of an elongated cube.

L. J. S.

¹ This is the first number of a new journal, edited by Prof. F. Millosevich from the Istituto di Mineralogia della R. Università di Roma.

GARRIDO (Julio) & VALDEAVELLANO (Carlos). *Nota sobre algunos cristales españoles de mispíquel*. Mem. R. Soc. Española Hist. Nat., 1929, vol. 15, pp. 625-634, 1 pl., 14 text-figs.

On crystals of mispickel from various localities in Spain the forms observed are *c b m q n t u p e* [Dana's letters]. L. J. S.

MACMURPHY (F.). *Dumortierite from Riverside County, California*. Amer. Min., 1930, vol. 15, pp. 79-80.

Rose-lavender stains and rosettes of dumortierite, often altered to sericite, were found in granodiorite at several places near the Cajalco tin mine, 13 miles south-west of Riverside. Pleochroism, α ($= c$) pink, β and γ colourless; $2V$ 39° , β 1.690, $\gamma - \alpha$ 0.026. L. J. S.

MÉLON (J.). *Contribution à l'étude des propriétés optiques de la chalcantithe*. Bull. Soc. Franç. Min., 1924, vol. 47, pp. 141-146, 2 figs.

The average value for the extinction-angle measured on the face m ($1\bar{1}0$) of chalcantithe to the edge ($1\bar{1}0$):(010) is $75^\circ 20'$. Combined with Dana's data for the position of the acute bisectrix and the value of $2V$, this result enables the pole of the plane of the optic axes to be plotted on a stereographic projection. It is found to lie on the great circle passing through the poles of ($1\bar{1}0$) and (001) [Dana's axes]. The optical characters deduced for sections parallel to ($1\bar{1}0$), (010), and (110) are confirmed. As artificial chalcantithe usually crystallizes on the ($1\bar{1}0$) face, its determination by optical methods can now be readily carried out. F. A. B.

MÉLON (J.). *Sur une nouvelle face de la stibine*. Ann. Soc. Géol. Belgique, 1929, vol. 53, pp. B 18-B 20, 1 pl.

Some crystals of stibnite from Felsőbánya, Hungary [= Baia Sprie, Romania] are terminated by the acute pyramid K (6.14.3) [Dana's axes]. A stereographic projection of the forms of stibnite is added.

L. J. S.

MELON (J.) [i. e. MÉLON]. *Orientation de l'ellipsoïde optique de la rhodonite*. Bull. Acad. Roy. Belg., 1930, ser. 5, vol. 16, pp. 66-72, 3 figs.

BUTTGENBACH (H.). *Apparences optiques des lames de clivage de la rhodonite*. Ibid., pp. 35-65, 12 figs.

The Fedorov stage examination of rhodonites from Franklin Furnace, Långban, Pajsberg, and Ekaterinburg gave slightly ambiguous results, agreeing with two possible optical orientations. Extinction-

angles on cleavage-flakes decided which was correct. The results for Pajsberg (Harstig mine) material were: γM ($1\bar{1}0$) 122° , γm (110) 108° , γc (001) 55° , βM 67° , βm 45° , βc 35° , αM 41° , αm $129\frac{1}{2}^\circ$, αc $86\frac{1}{2}^\circ$; $2V$ 76° , positive. Positive extinction direction on M inclined $12\frac{1}{2}^\circ$ to $[Mm]$; on m , $29-31^\circ$ to $[Mm]$; on c , $38-42^\circ$ to $[mc]$ or $[Mc]$; $\gamma - \alpha$ 0.014 . The material from the other localities gave similar results. Density and refractive index measurements and chemical analyses are unfortunately lacking. [This orientation differs from that found by the abstractor (Min. Mag. 1929, vol. 22, p. 193) by a rotation of nearly 90° about the c -axis. That the abstractor's orientation is the correct one is shown by the fact that the positive direction of extinction on m (110) is almost parallel to the edge mk [$110 : \bar{2}21$]].

M. H. H.

KRENNER (Josef) [1839-1920], [edited, with notes, by] ZIMÁNYI (K.).

Mineralogische Mitteilungen aus Ungarn. Centralblatt Min., Abt. A, 1929, pp. 27-46, 13 figs. [Cf. M.A. 3-548, 4-8, 4-81].

8. Pyrite (pp. 27-34, 10 figs.).—Crystallographic descriptions of material from eight localities. New forms noted are (14.13.0) and (13.5.0). 9. Eggonite (pp. 34-38).—This was described from Altenberg, Belgium, by A. Schrauf in 1879 as a triclinic cadmium silicate, and afterwards stated to be baryte. On two specimens it was found that the small crystals had been stuck on the hemimorphite matrix; and as similar crystals were found associated with miargyrite and diaphorite from Felsőbánya, it is concluded that this is the correct locality. The prismatic crystals are orthorhombic with $a : b : c = 0.87749 : 1 : 0.53694$ and the forms m (110), d (011), a (100), b (010), (451); cleavage (100) very good. Optic axial plane (010), $Bx_a \perp (100)$, negative, $2V$ $60^\circ 34'$, β 1.5901 . Qualitative tests show the mineral to be a hydrous aluminium phosphate, and as it is isomorphous with strengite the formula is perhaps $AlPO_4 \cdot 2H_2O$. 10. Glaucodot from Oravicabánya (pp. 39-41).—This was first mentioned by A. Breithaupt in 1850, but it was described as a new mineral, alloclaste, containing Bi 23-33 % by G. Tschermak in 1866. The columnar crystals with steel-grey colour and slight reddish tinge are embedded in calcite with native bismuth, bismuthinite, and mispickel. They show a good prismatic cleavage of 105° [?] and a less good basal cleavage. Analysis by J. Loczka of carefully selected material gave S 20.59, As 42.97, Co 31.64, Fe 5.33, Bi 0.10, Au 0.09 = 100.72, showing practically no bismuth and much less iron than in the

glaucodot of Hakansbö, Sweden. The latter is near danaite, the cobaltiferous variety of mispickel; and allocrase is a mixture. 11. Fluorite from Kapnikbánya (pp. 42-44, 1 fig.).—Small crystals show the forms *d o a n m* [Dana's letters]. 12. Haematite from Dognácska (pp. 44-46, 2 figs.).—The fine crystals found in the Markus mine in 1883-7 and in 1903 were examined by Krenner in 1887, but have since been described in greater detail by other authors. They show stellate *c*-twins and lamellar *r*-twinning. L. J. S.

GOTTFRIED (C.). *Die Mineralien der Adamellogruppe. 2. Hornblende aus dem Riesentonalit des Val di Doi.* Verhand. Geol. Bundesanst. Wien, 1929, pp. 230-231. [Cf. M.A. 4-192.]

An older tonalite-pegmatite is unusually rich in large (up to 30 cm.) crystals of hornblende. These are greenish-black with d 3.187, α 1.658, β 1.671, γ 1.685, $2V$ over 80° , negative; $c:\gamma = 22^\circ 6'$; pleochroism, α yellowish-green, β and γ green with brownish tinge. Analysis by Miss Bendig gave: SiO_2 4.62, TiO_2 2.21, Al_2O_3 14.01, Fe_2O_3 5.08, FeO 7.13, MnO 0.155, MgO 14.03, CaO 12.58, BaO 0.22, Na_2O 2.39, K_2O 0.34, P_2O_5 0.10, CoO 0.07, CuO trace, H_2O (100°) 0.10, H_2O ($+100^\circ$) 2.10, total 101.13. The mineral is common green hornblende. L. J. S.

GOTTFRIED (C.). *Die Mineralien der Adamellogruppe.* Chemie der Erde, 1930, vol. 5, pp. 106-112.

III, Garnet from near Passo del Termine, Trentino.—Reddish-brown crystals (110) from marble at a tonalite contact have d 3.512, n_{e25} 1.7553, n_{540} 1.7585, n_{488} 1.7624, and gave analysis I, corresponding with grossular 80.55 %. IV, Idocrase from Val Pallobia.—Olive-green crystals from marble at a tonalite contact show the forms *a m z e p f s* [Dana's letters] and gave $a:c = 1:0.5391$. They are optically uniaxial and negative ω 1.719, ϵ 1.715, but in one case biaxial and positive; d 3.336, analysis II by Miss Bendig agrees with Tschermak's formula $\text{Si}_{17}\text{Al}_{10}\text{Ca}_{18}\text{Mg}_2\text{H}_6\text{O}_{72}$. X-ray rotation photographs give a unit cell of dimensions $a = 22.03$, $c = 11.89 \text{ \AA}$., containing 2.3 of these molecules, i.e. 168 oxygen atoms. The space-group is D_{4h}^4 .

	SiO_2 .	TiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	H_2O .
I.	39.66	0.46	18.77	2.52	1.92	0.07	2.06	34.79	0.07
II.	37.03	0.75	16.25	3.13	1.00	0.04	2.45	36.39	2.29

II, also ZnO 0.29, Na_2O 0.28, K_2O 0.03, F 0.31, total, less O for F 100.15.

L. J. S.

THUGUTT (Stanisław Jósef). *O naturze lublinitu i jego rozpuszczalności w wodzie przekroplonej.*—*Sur la nature de la lublinite et sa solubilité dans l'eau distillée.* Arch. Min. Tow. Nauk. Warszaw. (Arch. Min. Soc. Sci. Varsovie), 1929, vol. 5 (for 1929), pp. 97–104 (Polish), pp. 105–107 (French).

A summary is given of the various views as to the nature of 'rock-milk', particularly the lublinite (of J. Morozewicz, 1907) occurring on chalk in palatinate Lublin, Poland. It has generally been thought that the thread-like crystals are calcite elongated along a rhombohedral edge, and hence giving oblique extinction between crossed nicols. Material from Mt. Puławsk on the Vistula gave on analysis by C. Jaksa-Bykowski: CaO 54.56, $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$ 0.18, insol. 0.76, CO_2 44.37, loss at 160°C . 0.21 = 100.08. The material finely powdered in an agate mortar and heated with water in an autoclave for 72 hours at 233°C ., gave a colloidal suspension (particles less than 1μ) containing 0.0137 gram CaCO_3 per 100 c.c. This colloidal lublinite on evaporation deposited rhombohedra of calcite, which with cobalt nitrate (Meigen's reaction) gave a greenish-blue colour (the greenish tinge being due to iron), whereas the original lublinite gave a lilac colour. Lublinite has probably been formed at a low temperature [cf. M.A. 4-157].

L. J. S.

ŁASZKIEWICZ (Antoni). *Blödýt z Kałusza.*—*Sur la bloedite de Kałusz.* Arch. Min. Tow. Nauk. Warszaw. (Arch. Min. Soc. Sci. Varsovie), 1929, vol. 5 (for 1929), pp. 79–94 (Polish), pp. 95–96 (French), 1 fig.

Measurement of crystals of blödite from Kałusz, Poland, gave $a:b:c = 1.3496:1:0.6729$, $\beta = 79^\circ 15'$, with the forms $abc \lambda n l n \nu \mu deq p u t s o z x$ [Dana's letters]. Combinations of forms are tabulated and compared with those for other localities. The prominent zones are $[100]$, $[0\bar{1}1]$, and $[001]$. The optical constants were determined for several wave-lengths (700–400 $\mu\mu$); for sodium-light α 1.4826, β 1.4855, γ 1.4869, $2V$ $69^\circ 24'$, $\text{Bx}_a(\alpha):c = -42^\circ 11'$.

L. J. S.

JUNG (H.) & KÖHLER (E.). *Untersuchungen über den Thuringit von Schmiedefeld in Thüringen.* Chemie der Erde, 1930, vol. 5, pp. 182–200, 3 figs.

Thuringite from Schmiedefeld, Thuringia, consisting of an olive-green compact aggregate of fine scales, with d 3.187 (3.180–3.194),

gave on analysis: SiO_2 20.82, TiO_2 trace, Al_2O_3 17.64, Fe_2O_3 8.70, FeO 37.96, MgO 4.15, $\text{H}_2\text{O} +$ 10.31, $\text{H}_2\text{O} -$ 0.07 = 99.65, agreeing with the formula $14(\text{Fe,Mg})\text{O} \cdot 5(\text{Al,Fe})_2\text{O}_3 \cdot 12\text{H}_2\text{O} \cdot 7\text{SiO}_2$. Most of the water is expelled at about 420°C ., and the dehydration curve is very similar to that of kaolin. X-ray powder photographs of thuringite are compared with those of quartz, magnetite, and kaolin; some of the magnetite and kaolin lines correspond, but those of quartz are absent. Magnetite has a unit cube of edge $a = 8.393 \text{ \AA}$. containing eight molecules.

L. J. S.

GRAHAM (R. P. D.) & ELLSWORTH (H. V.). *Cenosite from North Burgess township, Lanark County, Ontario*. Amer. Min., 1930, vol. 15, pp. 205-219, 4 figs.

'Cenosite, or more properly kainosite', has been found on the old dump of a pit formerly worked for apatite and phlogopite at this locality, where it occurs on calcite in crystalline limestone. The small ($\frac{1}{2}$ -1 mm.) pale-pink crystals are orthorhombic with prismatic habit, $a:b:c = 0.8759:1:0.4638$; forms (100), (010), (110) and several other striated prisms, (101), (011). (In H. Sjögren's 1897 orientation of crystals from Nordmark, Sweden, the prism-zone was made to coincide with the a -axis.) Sp. gr. 3.612, H. $5\frac{1}{2}$; $\alpha (= c)$ 1.664, $\beta (= b)$ 1.689, $\gamma (= a)$ 1.691, negative, $2V$ $39^\circ 45'$. Analysis gave SiO_2 34.66, $(\text{Ce,L a,D i})_2\text{O}_3$ 3.22, $(\text{Yt,E r})_2\text{O}_3$ 35.46, CaO 16.72, SrO 0.31, $\text{Al}_2\text{O}_3 (+ \text{Fe}_2\text{O}_3)$ 0.22, MnO 0.02, MgO 0.19, Na_2O 0.27, K_2O trace, CO_2 6.58, SO_3 0.04, H_2O 2.54 = 100.23, corresponding with $2\text{CaO} \cdot (\text{Ce,Yt})_2\text{O}_3 \cdot \text{CO}_2 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$. Water is expelled only at a high temperature. A small amount of scandium appears to be present. Although the mineral shows certain differences from the original kainosite from Norway and that from Sweden, these do not appear to be essential.

L. J. S.

SHORT (M. N.) & SHANNON (Earl V.). *Violarite and other rare nickel sulphides*. Amer. Min., 1930, vol. 15, pp. 1-22, 10 figs.

The characters of nickel sulphides from several localities as seen on polished surfaces in reflected polarized light are described. Violarite from Vermilion mine, Sudbury, Ontario [M.A. 2-338] has a violet colour and perfect cubic cleavage, and it is often surrounded by a zone of millerite; analysis I of material gouged out from polished surfaces gives the formula $(\text{Ni,Fe})_3\text{S}_4$. Violarite from Friday mine, Julian, California, differs in being white; anal. II agrees with the same formula. Siegenite from Fredericktown, Missouri, gave anal. III,

formula $(\text{Ni}, \text{Co}, \text{Fe})_3\text{S}_4$, with galena and chalcopyrite. Buddington's 'nickel mineral X' [M.A. 2-447] is probably identical with violarite. Other minerals described are polydymite and bravoite.

	S.	Ni.	Co.	Fe.	Cu.	Pb.	Insol.	Total.
I.	41.68	38.68	1.05	17.01	1.12	—	0.40	99.94
II.	42.17	33.94	2.50	19.33	1.05	—	1.31	100.30
III.	30.57	11.27	8.72	15.17	13.10	9.40	11.88	100.11

L. J. S.

WOLF (Albert G.). *Hauerite in a salt-dome cap rock.* Bull. Amer. Assoc. Petroleum Geologists, 1926, vol. 10, pp. 531-532, 1 fig.

HANNA (Marcus A.). *A second record of hauerite associated with Gulf Coast salt domes.* Ibid., 1929, vol. 13, p. 177.

Hauerite (MnS_2) was found in bore-cores from the Big Hill (or Gulf) salt-dome, Matagorda Co., Texas, which is worked for sulphur. Octahedra (up to 1 inch) with cube planes and globular aggregates of crystals are embedded in limestone or calcareous clay, or in anhydrite with pyrite and galena. The second occurrence, similar in type, is in the High Island salt-dome, Galveston Co., Texas.

L. J. S.

FEIGL (F.) & LEITMEIER (H.). *Ein rascher und empfindlicher Nachweis der Kieselsäure.* Min. Petr. Mitt. (Tschermak), 1929, vol. 40, pp. 1-5.

The blowpipe test for silica as a skeleton in a borax or microcosmic-salt bead is unreliable. A quick and delicate test is given by the fact that a soluble silicate forms with ammonium molybdate a complex silicomolybdate, and this with a solution of benzidine in acetic acid with sodium acetate gives a blue coloration. The similar reaction given by molybdic acid is readily distinguished by the addition of oxalic acid, which decomposes the phosphomolybdate.

L. J. S.

LEITMEIER (H.) & FEIGL (F.). *Der Nachweis von Fluor in Mineralien und Gesteinen.* Min. Petr. Mitt. (Tschermak), 1929, vol. 40, pp. 6-19, 1 fig.

(1) Alizarin method.—The reddish-violet colour given by a soluble zirconium salt with alizarinsulphonic acid is destroyed by fluorides, and in their presence the colour of the solution changes to yellow, that of the alizarinsulphonic acid. (2) Silicofluoride method.—The mineral mixed with quartz is treated with sulphuric acid and the silicon fluoride evolved collected in a drop of water; silica is then tested for by the benzidine method (preceding abstract).

L. J. S.